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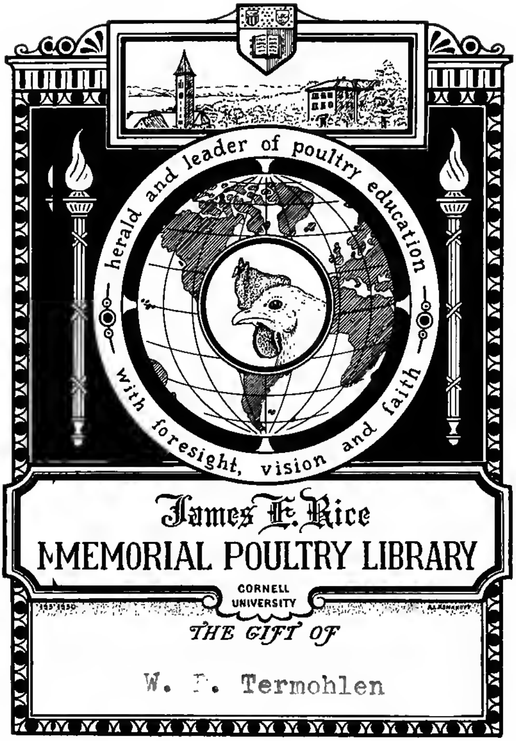
Eggs from Every Cage

by H. E. SWEPSTONE



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Eggs from Every Cage

DESCRIBING LAYING BATTERY MANAGEMENT

by

H. E. SWEPSTONE

WITH FOREWORD BY

ALAN THOMPSON
Editor of "Poultry Farmer."

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AUTHOR'S FOREWORD

Since the time when the following pages first appeared as Articles in " Poultry Farmer " prices of feeding stuffs, eggs, etc. have altered considerably.

As there is little reason to expect prices to remain static for long, there is no point in altering figures now which are almost certain to require further alteration in the near future.

Readers are requested therefore to kindly substitute current prices for those given.

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FOREWORD

Right from the days of Gervase Markham's " Cheap and Good Husbandry," produced in 1614, poultry authors have recognised that poultry are kept for profit. But on the rare occasions that they have produced a balance sheet it has not shed much light upon their own proceedings.

Truth to tell, poultry authors may be admirers of hens but with the notable exception of Lewis Wright they have not been close dabblers in them.

Swepstone, on the other hand, has been in the closest contact with the hen for over 20 years but his admiration is bestowed less on the hen herself than on her capacity to earn an acceptable profit.

In 1911 he made his first effort in poultry farming in British Columbia. It was short lived. From there he moved on to Ceylon where he was in the export trade and returned to the East after World War I. Still unable to settle down he was back again in England in 1923 and has been poultry farming ever since.

He went in for poultry as so many have done with little sound advice to guide him; and he derived his skill as a producer in the hard school of experience. That is to say he made every known mistake and a few extra ones which he claims to have invented himself. Finally a severe attack of coccidiosis nearly wrote him off as a poultry farmer.

It is because of that harrowing experience, which he has no wish for others to suffer, that the author has, after much coercion, written this book; for Swepstone is a modest man and every telling sentence has cost him as much effort and thought as the prose of Robert Louis Stevenson.

Most of the material has previously appeared in the pages of " Poultry Farmer " and whilst this weekly can claim to have many practical correspondents it has few who can support every fact with figures going back for many years.

ALAN THOMPSON,
Editor, " Poultry Farmer,"
93 Long Acre,
London, W.C.2.

FIRST RUNG IN THE POULTRY LADDER

In most trades it is the custom for beginners to start at the bottom, where they first gain some experience before getting on to more advanced work.

Specialised commercial egg production is the bottom rung of our particular ladder, with pullet-rearing for " egg production only " as the second step. I specify " for egg production only " because rearing potential breeding stock is not a job for the novice.

Fortunately in starting at the bottom the poultry beginner is not in any way sacrificing his chances of making a good living, because a well-managed egg farm is a profitable undertaking in normal times.

If, after serving what may be looked upon as an apprenticeship, he wishes to climb up the ladder, the experience gained will stand him in very good stead.

In my opinion, after trying several methods during the past twenty years, the best of all is the Single Hen Laying Battery. In fact, I would rather quit altogether than attempt commercial egg production on any other lines.

Not because I am wedded to the battery as such, but because I do want all my birds under individual observation all the time, and also because it is the only system which I have found yields me a satisfactory profit.

The best way to stock the battery is with pullets bought in at the age of 16 weeks. This, of course, applies to normal times. At the present moment pullet prices are far too high for the commercial man, so he must put his foot on the second rung of the ladder and rear day-old pullets.

Some people are put off laying batteries because they are told, usually by people with no practical experience, that the system is cruel. This is not so, and there have been various answers made at different times. The accusation is fully disproved really by the fact that birds do extremely well in batteries, both as regards production and in their own bodily health. No domestic animal will " do well " if it is unhappy.

Another objection raised is that of high cost of lay-out, but a little examination of this point is worth while. Also, if the higher earning capacity of the birds is taken into account, it will be found that the extra initial cost pays a good dividend.

I will leave cost of lay-out and deal first with earning capacity. The average egg farm is content with a yield of 12 dozen eggs per bird per year, total farm output. The average for the whole country is less than this number.

The battery bird will produce 15 dozen eggs per year, total farm output on the hen-day basis, *i.e.* an increase of 25 per cent. in gross sales. This is not an excessive estimate : my own pre-war output was better than 16 dozen.

Assuming cost of maintenance per bird to be the same under different systems, the three dozen extra eggs are all clear profit. Say an additional 4s. to 5s. per bird at peace-time prices.

The above assumption as regards maintenance cost per bird is not unwarranted. Labour in the battery is about the same as with other systems. (I always discourage the idea that the battery saves on this item). Battery birds certainly eat more, but against this can be set the higher price they realise when sold off as boiling fowl.

This is the type of laying battery house H. E. Swepstone prefers. Plant should be arranged like ribs projecting from the backbone of a good road.

Then there is in the battery the lower rate of mortality as represented by unsaleable birds, because faults can be spotted before the birds become unmarketable.

I think, therefore, I am justified in claiming battery maintenance cost per bird to be no higher than other methods, and we are left with the extra profit of 4s. to 5s. per bird.

It is a hopeless proposition to try to estimate now the probable cost of buildings, cages and equipment for a post-war laying battery plant.

No one, without the gift of second sight, can foretell what will be the cost of the various materials required nor the level of wages which will rule in the appliance-making industry. One must also bear in mind that, as the poultry industry has not been amongst the most favoured during the war, it is quite on the cards that when timber, wire netting and sheet metal becomes gradually available for commercial use the poultry industry may find itself well down at the wrong end of the queue.

In the long run this may prove an advantage, as it may save some people from spending an undue amount on layout when, by waiting a short time, they could achieve the same size farm at considerably less capital outlay. And when all is said and done, over-capitalisation is just as bad on a poultry farm as anywhere else.

PROFITS.

Another question which appears likely to remain unanswered until the time comes is that concerning the probable profit to be earned from commercial egg production after the war.

There is an enormous potential capacity for providing employment in the poultry industry and its ancillary trades, of which the Government is no doubt as well aware as the most enthusiastic poultry man. Therefore it seems reasonable to expect conditions to be such that a competent man will be able to earn a fair living.

If a fair living can be achieved on the more usual methods of egg farming, then the laying battery man should do pretty well.

The above is an explanation of why, in what follows, prices are generally omitted. Quantities will be given where possible and anyone sufficiently interested will just have to work out the cost at the current prices.

In my opinion the battery system offers the best return for the amount of money invested of any method of commercial egg farming.

But to people without any experience of the system, or of egg farming at all, I do suggest most earnestly that they acquire some before investing their money.

The battery system does not suit everyone, nor does everyone suit the system.

Of course, if it can be afforded, it is quite good fun to start so to speak " blind " and learn as one goes along. " Learn as you earn," so to say, but it can be a rather expensive way of gaining experience, with rather more " learn " than " earn " in the early stages.

SITE.

The very first thing which must be done is to find a suitable site and here the battery compares most favourably with any other.

A very small space is needed, as housing for over 6,000 birds can be erected on a single acre.

Actual size of house and recommended spaces between buildings will be given later, from which can be worked out the amount of room required for a plant of any given capacity. If it is intended to rear replacements on the premises, more room will be wanted, the additional space depending on whether rearing is to be on intensive or free range lines.

As to the site itself. It should be on a good road, have an ample water supply and main electricity if possible. I do not like an exposed position nor one which is so sheltered that it tends to be stuffy in still weather. Shelter from north and east is the thing to aim at to get protection from the really cold winds. Uneven and hilly sites should be avoided.

It is not satisfactory to dig in a house at one end and prop up the other on high brick piers. The ideal is a flat and almost level site with the type of soil which does not hold surface water, but at the same time is firm enough for a good road to be laid without having to dig too deep to secure a firm foundation.

COST OF PLANT COMPARED WITH OTHER SYSTEMS.

Now as regards cost of plant. The battery is certainly higher per bird, but is housing on other lines as cheap as it at first appears ? The battery house can be kept at full strength all the year round.

But this is not possible where birds are run in flocks, because once a flock is settled down into its laying quarters it does not pay to add an odd bird or two every now and then to replace culls and losses. It unsettles the original flock, which, in turn, bully the newcomers, and egg output goes down.

Yet deaths will occur, and if culling is done properly it soon reduces the flock considerably.

This means that the house is only fully occupied for a relatively small part of the year; the rest of the time it is running below capacity.

In effect, therefore, the cost per bird of flock housing is the price of the house divided, not by its capacity, but by the average number of birds accommodated for the full year.

In arriving at this figure due allowance must also be made for the period it is completely empty for spring-cleaning.

I do not suggest that the following figures are accurate, but they illustrate the point :—

Cost of 100 bird house complete £50 × 10s. per bird, nominal.

Flock settled in	100
Losses and culls 30 birds. Deduct half the number, assuming same to be evenly spaced during the year	15
Average number of birds housed for year	85
House empty for spring-cleaning for two weeks, deduct 1/26th	3
Net average flock for year	82

82 birds divided into £50 = actual housing cost 12s. 2d. per bird, an increase of over 20 per cent. on the apparent cost.

The laying battery is quite a different proposition. Price of lay-out divided by capacity does give cost per bird without any additions.

New pullets can be put in whenever a cage is vacant and the house and cages kept clean without an annual turnout.

Of course this presupposes an adequate supply of pullets being available at all seasons. An objection may be raised here on the grounds that certain months are entirely unsuitable for hatching, and that therefore the pullets will not be ready when wanted. This is the accepted view in some quarters, but it need not be taken seriously.

Good chicks can be hatched all the year round by a skilful breeder, and good chicks will rear well at any time.

I have written all this, not because it matters a hoot to me personally whether or no the battery becomes the principal system of producing commercial eggs, but because it has suffered a good deal of disparagement at one time and another, which may put people off from what is really a sound venture and one which is not so very difficult to master.

Of course there must always be an element of chance about livestock, but with the birds always under one's eye at all times the risk is reduced to a minimum.

STANDARD HOUSE.

Having acquired the site, the next thing is to plan the layout so that the first house or houses and those to be built later will all be equally accessible.

My own plant is based on the farm road which crosses the place and has houses at right angles to it on both sides. This is about as convenient as it can be as each house has sufficient room to take half a week's supply of feed and the lorries deliver twice a week just where the food is going to be used.

There is no need whatever to sacrifice convenience for the sake of facing the houses in any particular direction. I know that there is very strong support for the east and west aspect—*i.e.*, the long sides facing east and west, but I find north and south quite satisfactory and remain convinced that convenience is the thing to aim at.

I favour a wooden floor because ventilation can be arranged from underneath and I do not bother about direct light reaching the birds. By direct light is meant light which does not pass through ordinary glass windows.

Even if special shutters are provided for the admission of direct light, it will still be necessary to add cod-liver oil to the food to ensure all birds getting sufficient Vitamin D. So why go to the extra trouble of daily opening and closing shutters which are not really essential ?

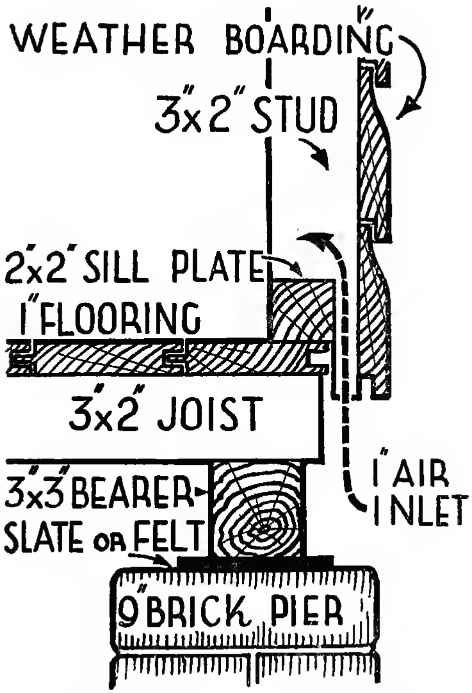
There are two sides to the housing question. First, favourable conditions for the birds. Second, and almost equally important, comfortable working conditions for the poultryman. If the house is badly ventilated, draughty and so on, the birds won't do well. If the operator is cramped for room, his work will suffer, and so also his temper.

The house I look upon as standard is 70 ft. long, 20 ft. wide, 6 ft. 9 in. to eaves and 11 ft. 9 in. to ridge. It holds 504 cages of my own pattern, which are probably a trifle wider than some others. The house stands on brick piers, five rows of 13 piers each, which are sunk 18 in. into the ground as an insurance against rats burrowing under them.

This is not so unlikely as it may seem at first sight, and from personal experience, I know how awkward it is when the footings do start disappearing into the rat holes below.

Flooring is wood, heavily creosoted when laid and refreshed periodically when cages are moved. Intake ventilators are arranged through the floor.

There are four inlets. Two are built into the framework



How ventilation is arranged at floor level.

(these are permanently open), and two controllable inlets are let through the floor, one on each side of the centre service passage. They are fitted below the projecting floors of the cages to be out of the way.

The cover for these inlets is just a board, smooth on one side but on the other side there are pieces of 1 in. batten nailed crosswise every 3 ft. To close the inlet the board rests smooth side down. To open, the board is reversed and is held 1 in. above the floor by the cross battens. These centre service passage inlets are 2 in. wide extending the full length of the cages.

They are rat-proofed with ½ in. netting nailed on from underneath and the idea of the cover board is partly to disperse the air as it enters and partly to prevent the inlets being choked up.

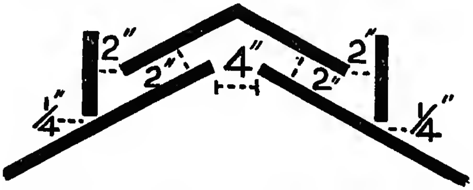
It is not entirely successful in its second role, and the inlets must be cleaned out occasionally.

The permanently open floor vents are built in as follows: Using 3 × 2 in. studding, fit a 3 × 2 in. plate at the eaves, but at floor level use 2 × 2 in. for the plate. Cut the ends of the studs so that they overlap the bottom plate by the difference in their respective thicknesses, and erect with the overlap to the outside.

When the floor is laid up to the inner side of the bottom plate and the weatherboard nailed on, there remains a space of 1 in. between the outer side of the bottom plate and the weatherboard (see sketch).

AIR.

For years past the importance of good ventilation has been emphasised by everybody connected with poultry, and yet one can still find badly ventilated poultry houses. It must receive something more than mere lip-service if the battery house is to be successful. It must smell fresh in the morning when first entered and at the same time it must not be draughty.



Section through the roof ridge showing the ventilation arrangement.

Intakes, as described, work very well indeed with ridge ventilation on the lines of the old ridgecap, but amended as shown on page 16 by fixing baffle-boards on each side of, and a couple of inches away from, the capping. The top edges of the baffle-boards are a little lower than the top of the ridge-cap and the lower edges are raised $\frac{1}{4}$ in. off the felt for drainage.

Perhaps on a different type of site something more elaborate may be needed. If factory-type extractors are used, however, it will be most advisable to get the maker's advice as to the size and number wanted and also his opinion on the size, number and position of intakes.

In addition to the above, there is a ventilator above each window. This is simply an aperture 2 in. wide cut through the weatherboard and baffled from the outside, as shown in the illustration.

There are 10 windows on each side of the house, hinged at the top and opening outwards. They are made up of two panes of 24 × 18 in. glass, fitted about 3 ft. 6 in. apart, and hung 6 in. below the eaves. Roof lights, consisting of single panes 24 × 18 in. are let in the roof 2 ft. 6 in. below the ridge ; 10 lights on each side. There is also a gable-end window at each end, which is not hinged, but pivoted on its centre and controlled by rope.

All windows and frames of roof lights are painted, particular attention being paid to proper priming before assembly. Creosoted window-frames have not proved satisfactory.

ELECTRIC LIGHTING.

It is rather a debatable point as to whether night lighting during the shorter days actually increases a bird's total year's output, though personally I am certain it does. But there is no disagreement over the fact that night lighting results in a higher winter egg yield, and in building a battery house I look upon the inclusion of electric light as essential.

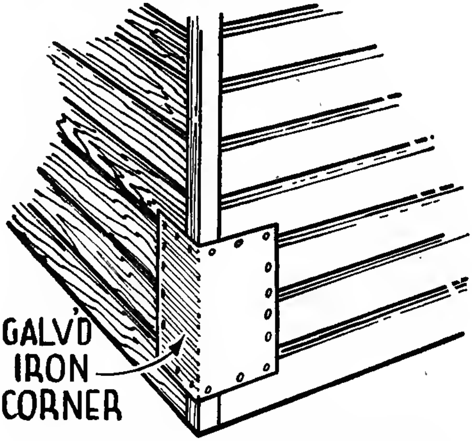
Forty-watt bulbs spaced at 10 ft. intervals in each service passage give a very good light. A 2 × 2 in. batten laid on top of the cross-ties and running down the centre of the building makes an excellent carrier for the lights in the centre service passage, while the lights in the side service passages can be fixed to the rafters just above the top plate. The lamps will then be just about 7 ft. from the floor.

It is not a good plan to hang lights too high, as the projecting floors of the upper tiers of cages cast a shadow on the bottom-feed-box, thus defeating one's effort to get as much light as possible into the feed-boxes.

RATS.

The best time to try and cope with these little pests is when building the house, so as to keep them out instead of having to get them out after they have found their way in— a much more tiresome process.

Under the floor, wherever a rat can find foothold within nibbling reach of the floorboards, ½ in. wire netting is fixed to the underside of the floor. The house stands on 18 in. piers, so that in practice ½ in. netting need be nailed only above piers and sleepers. On uneven ground it might be necessary to do some additional wiring where the ground rises to a level dangerously near the floor. Very likely, under such circumstances, it would be easier to level off the ground instead.



Rats can climb up corners, but metal "patches" like this will stop them.

Rats can climb up the corners of houses, and a good way to stop them is to fold round the corner a 12 in. square sheet of galvanised iron, so that there is 6 in. showing on each side (see drawing).

With houses 18 in. from the ground, I have found it better not to carry fine-gauge netting down from the side of the house into the ground. Admittedly that will keep rats from getting under the house for some time, but when they do penetrate, the surrounding netting is more of a protection for the rats than the house.

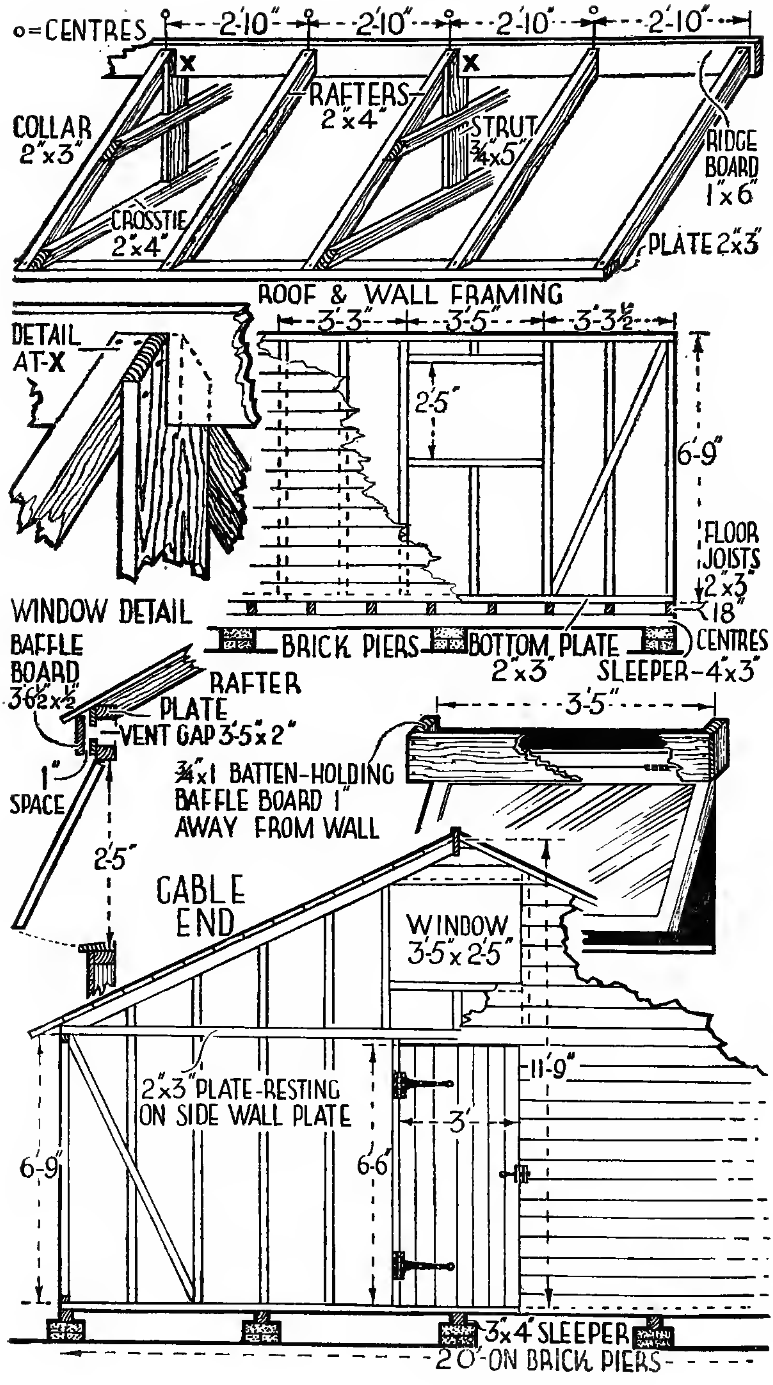
WATER.

Water should be laid on to each house into a suitable-sized storage tank. If the cages are fitted with continuous water-troughs, the tank must be high enough up for gravity feed into the top trough and, in this case, the shape of the tank is not very important, as the outflow will be slow. If cages are fitted with individual water-pots, which are filled by hand, the tank must be high enough for the watercart to be pushed under the tap.

Here I recommend the tall, circular type of tank fitted with a 1 in. full-way stop-valve. It is surprising how quickly the push-cart will fill from a good-sized tap with the pressure of a tall tank behind it.

I do not kid myself that my houses are perfect, but they are sturdily built and the birds do well in them. Also, and very important, there is plenty of working space round the cages, and I am quite certain that comfortable conditions for the attendant more than compensate for the small extra first cost.

It is so easy to save on initial outlay by cutting down size of house, and so practically impossible to rectify the mistake later, when experience shows the need for that little bit of additional room.


o=CENTRES
2'10"
2'10"
2'10"
2'10"
X
X
COLLAR 2"x3"
RAFTERS 2"x4"
STRUT ¾"x5"
RIDGE BOARD 1"x6"
CROSSTIE 2"x4"
PLATE 2"x3"
ROOF & WALL FRAMING
DETAIL AT-X
3'-3"
3'-5"
3'-3½"
2'5"
6'-9"
FLOOR JOISTS 2"x3" 18" CENTRES
BRICK PIERS
BOTTOM PLATE 2"x3"
SLEEPER-4"x3"
WINDOW DETAIL
BAFFLE BOARD 3'6½"x½"
RAFTER
PLATE
VENT GAP 3'5"x 2"
1" SPACE
2'5"
¾"x1 BATTEN-HOLDING BAFFLE BOARD 1" AWAY FROM WALL
3'5"
CABLE END
WINDOW 3'5"x 2'5"
11'-9"
2"x3" PLATE-RESTING ON SIDE WALL PLATE
6'-9"
6'-6"
3'
3"x4" SLEEPER
20'-ON BRICK PIERS

HOUSE PLAN

These are the general specifications and essential plans for building my ideal battery house.

SPECIFICATION.

Length—70 ft.

Width—20 ft.

Height to eaves—6 ft. 9 in.

Height to ridge—11 ft. 9 in.

Footings—Five rows brick piers, 13 piers per row.

Sleepers—3 × 4 in.

Floor joists—2 × 3 in. at 18 in. centres.

Flooring—$\frac{7}{8}$ in. T. and G.

Studding—2 × 3 in. at approximately 20 in. centres. Slight variation called for to accommodate windows.

Plates—Top plate 2 × 3 in. Bottom plate 2 × 2 in.

Cross ties—2 × 4 in. ten ties.

Collars—2 × 3 in. also ten, fitted above cross ties and braced with cross ties to ridge.

Rafters—2 × 4 in. spaced at 2 ft. 10 in. centres.

Roof Boards—$\frac{7}{8}$ in. T. and G. flooring.

Roofing Felt—Heavy two-ply. Laid from ridge to eaves. Joints come exactly over rafters and are battened down with 2 × $\frac{1}{2}$ in. battens, bedded in bitumen solution and closely nailed with 2 in. galvanised nails.

Windows—Ten on each side, evenly spaced, each window consisting of two panes of 24 × 18 in. glass. Hinged at the top to open outwards. Hung 6 in. below top plate.

Gable-end Windows—Similar to wall windows, but swung at the centre, the top opening in and bottom outwards.

Roof Lights—Ten on each side of roof, each consisting of one pane of 24 × 18 in. glass and fitted so that top edge of roof light is about 2 ft. 6 in. from ridge.

Weather-board—$\frac{7}{8}$ in. T. and G. Canadian pattern.

The drawings show at the top how the rafters are arranged with a detail immediately below and on the right showing how to fix the struts.

Next to this is a drawing showing how the wall framing is arranged, and again below this are front view and section sketches of the ventilator to be fitted above each window.

The bottom drawing is of the gable-end with door. Both ends are alike.

SPRING CLEAN.

There is one feature of poultry farming which I really do dislike, and that is the seasonal rush period, when either everyone is very much overworked or temporary workers are employed to cope with the extra jobs.

In the former case some work nearly always gets skipped, and in the latter one cannot expect a temporary worker to take the same interest as a regular employee. So some of the work done is still likely to be below par.

On a breeding farm or on what may be called a general poultry farm where a bit of everything is done, perhaps it is not possible to avoid the rush period. I don't know about that, but on a battery egg farm it certainly can be if every activity is mapped out to cover the whole year.

Spring-cleaning is the most awkward item, because it calls for not just one empty cage, but the whole block to be empty of which that cage is a part.

I know some successful battery owners are content to give an empty cage a rough do-out before putting in another bird. But I still believe that a thorough spring-clean periodically is needed by all poultry equipment, battery cages included.

But to get the cages empty for spring-cleaning is not always easy. Birds resent, to the point of going off lay, a move which gives them new neighbours. So that unless there is an empty house ready to take the whole of the house to be moved, a haphazard shifting to empty cages here and there in the rest of the plant may result in a serious drop in eggs.

On the other hand, if one is going to arrange to have an empty house to move into, one has got right away from the idea of spreading the work. It takes some concentrated effort to clean a whole house and all its cages at one go. Also moving all the birds from house to house, complete with record cards, which must not get mixed up, is quite a job, too.

The solution as I have found it lies in having blocks of cages each interchangeable. Personally I use single-sided blocks, three high and four long—*i.e.* 12 cages to the block. Provided the block can be easily handled, the number of cages per block is immaterial.

In addition to the blocks in the laying houses there are a number of spare blocks which are used for changing over. At regular intervals, depending on the total number of blocks to be cleaned during the year, one of these spare blocks is taken into the laying house to be put in the place of the block due for spring-cleaning.

To change the birds from one block to the other is quite simple and does not disturb them in the least.

First the birds are taken out of their cages and put into temporary quarters while the dirty block is drawn out of the line and the clean spare one put in its place. The birds are then returned to their original positions, so that they all have the same neighbours.

The dirty block of cages is taken to the cleaning shed and, when cleaned, is ready to serve as a spare.

When the block is drawn out of line the floor below it is swept and scraped if needed and given a good heavy coat of creosote.

Working on these lines, the job of spring-cleaning can be spread out evenly over the whole year, thus avoiding rush periods and ensuring that each cage does get a proper clean out at regular intervals.

As regards spring-cleaning the house itself, the floor under the cages is done when blocks are moved. The service passages and walls can be done at any time. The roof is the only trouble, but this is not serious. First the cobwebs and dust are brushed off with an ordinary broom. The birds get a bit restless during this process, but if it is done quietly and without fuss they soon settle down and will probably be taking no notice before the end of the house is reached. After brushing-down, a light spray of disinfectant finishes the job.

I will admit that it does not fit in entirely with the idea of an eight-hour day, but if possible I do prefer to do this roof cleaning business in the dusk of the longer evenings.

If it is considered unnecessary to spring-clean each cage every year, or contrariwise, that they should be done more frequently, the turnover can be arranged to bring each block through the cleaning shed just as often as the owner desires.

One point I should mention is in connection with the spare blocks. If wood is used in the cages, allowance must be made in the time taken over cleaning to permit of the creosote drying out before the spare is again put into use. Thus, say, three spares would be wanted to make a change of one per week.

The " temporary quarters " in which the birds are placed while blocks are changed over is about the size and shape of a cottage piano without a keyboard.

It is on " hospital bed " wheels for easy running and is divided into 12 compartments, three high and four long, the same as the block of laying cages. It is wheeled into position in front of the block to be emptied, and the birds transferred to the compartment opposite their respective cages. There is therefore no danger of any bird getting into the wrong cage when transferred back to the clean block.

Battery plant lay-out should be arranged with all houses projecting like ribs from a hard road running through the centre of the outfit.

Once in the cleaning-shed the block of cages will be very much easier to clean and a good deal of knuckle skin may be saved if it can be dismantled. At any rate, sufficiently for all corners to be readily accessible. Personally, I think a sectional job is best, and well worth the extra expense. Dipping in creosote is so much quicker than using a brush, that in a season or two one probably saves in time the additional cost of making cages sectional.

A point worth noting is that creosote remains sticky on wire for a very long time in some weathers, and it is worth while to keep the wire clean. To do this dip two edges of each frame at a time and hang to drain. Then dip the other two edges and let them drain off before putting the clean frame back in position. The creosote then has no chance of running down the wire.

I have no metal cages, not that I have anything against metal, but simply that I like wood and wire netting. Neither metal nor wood cages are proof against red mite, so one need not be influenced when making one's choice by the thought that these pests can be definitely eliminated.

I may say, however, that in my ten years' battery work I have never been troubled with red mite and it may be sheer prejudice, but I think perhaps the liberal use of creosote has had something to do with it.

With the exception of food boxes all wood used is soaked in a creosote bath before being made up and the periodic refresher given during spring-cleaning is fairly thorough.

In choosing a cage, the following points are worth paying some attention :

Floors.—These should project well forward so that the egg can be picked up easily, and there should be plenty of clearance for the collector's knuckles. Also, the farther the egg rolls away from the bird the less likelihood there is of egg eating. Square mesh woven wire or spot welded tram-line floors call for less slope than those made with wire netting. If the last is used, it should be not less than 16 gauge and must be well stretched. A suitable slope for netting floor is a fall of 3½ in. in 18 in., but the wire must be taut or eggs will not roll well.

All the floors in use on my plant are 16-gauge netting stretched over a wood frame. Some have been in use for ten years, and still show no signs of sagging because the wire was properly stretched to start with. I mention this as a counter to the criticism that wire netting has sometimes suffered.

Food Troughs.—Unless something is done about it there is a good chance of stale food accumulating at the ends of the troughs. To prevent this, I like a short trough, say one for each two birds, which can be easily lifted down for refilling.

It is then tilted up at one end, shooting what remains of the contents to the other end of the trough. If this is done to alternate ends at each filling up stale food is avoided.

If the food trough is positioned too low down it is rather inclined to trap the egg collector's knuckles. If too high the space between it and the projecting floor may be too big and the potential egg eater will soon take advantage of it. As a matter of fact, egg eating is not very prevalent as a rule, but there is no point in making it any easier for the bird than necessary.

SCRAPERS.

Some people prefer mechanical scrapers, of which there are various types, while others favour the removable droppings tray. Most, if not all, of the former have to be attended to each day whereas the removable tray need be cleaned off only once a week.

There is no doubt that the single operation of a mechanical scraper is quicker than the removable tray type, but when the time is multiplied by seven for the mechanical as against once for the tray, the advantage will lie with the removable tray.

Apart from the question of time in cleaning several days' accumulation of droppings is an aid to rapid culling and this is lost if droppings are removed daily.

Then, too, there is the question of spring-cleaning. If the droppings are to be cleaned off mechanically, the droppings board must be built in the full length of the line of cages and will present something of a problem when blocks are to be taken out for spring-cleaning.

CONTINUOUS WATER TROUGHS.

For Water Supply.—If there were never any risk of freezing—I should favour the continuous pipe with drinking holes run along the backs of the cages, provided it were equipped with some sort of pull-through for cleaning. It is simple and does prevent to a certain extent mash being transferred from food to water-trough as the birds have to turn round to the back of the cage for a drink.

But one cannot be sure that the water won't freeze and, if it does, the job of thawing it would be very awkward in such an un-get-at-able position.

I do not like the ordinary gutter water trough fitted either above or below the food boxes. A good deal of mash gets into them and the birds throw quite a lot of water on the floor and the fronts of their cages.

The watering system still in use on my plant is the two-bird box which holds about five pints. The sides and back of these water-boxes are 3 in. higher than the fronts, forming a screen which really does prevent water splashing.

The method takes more time to look after than the continuous gutter type, but not such a great deal more as the boxes are attended to only twice weekly. Once to be cleaned and filled and the second time filled only. On war-time feeding I have found it necessary to give an extra filling as water consumption is much higher than on peace-time foods.

IRRITATING GADGETS.

Whether wood or metal, mechanically cleaned or with removable droppings-trays, choose a well-built, rigid cage which will stand up to long service, and one which is easy to get at for spring-cleaning. Even if it cost a little more it will prove to be money well spent in the long run.

Running a laying battery consists of doing the same thing over and over again, maybe hundreds of times in succession. If, owing to poor design or faulty workmanship, troughs are unhandy or droppings-trays tend to stick when withdrawn, a great deal of time can be wasted. One also gets rather cross.

The gadget which fails to work is a prime source of irritation, so that a plain straightforward job will be more satisfactory than than one equipped with anything which may get out of order.

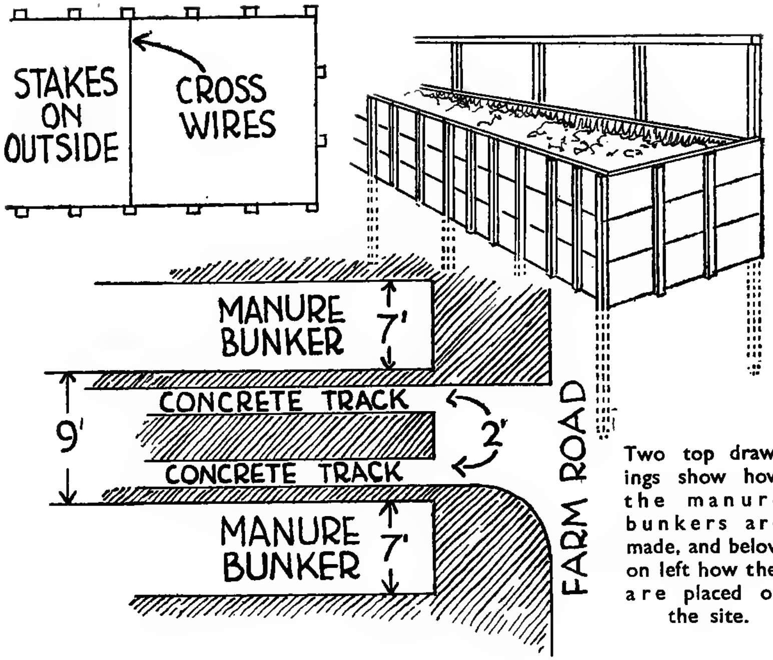
Repairing a broken-down labour-saving device will probably waste more time than the device has ever saved when in working order. And in the pure cussedness of things the breakdown is sure to occur at the most inconvenient moment.

MANURE BUNKERS.

In addition to battery houses and cages, the layout will not be complete without some kind of manure storage, an egg-packing room and workshop.

The quantity of manure which a few hundred birds will produce in the course of a week is an eye-opener, especially on war-time rations.

Some arrangements must be made about this, not only for storage, but also for its regular disposal.



Two top drawings show how the manure bunkers are made, and below on left how they are placed on the site.

My first effort in the storage line was a concrete-floored shed. This was given up because the lorry drivers complained that although the stuff near the front was easy to load, that at the back was too far from the lorry to be thrown up conveniently, and they had to shift it forward first and then put it up on the lorry. Another drawback was the very poor drainage afforded by the concrete floor.

So now my manure store consists of two bunkers in the open each 7 ft. wide by 18 in. deep, and set 9 ft. apart, so the lorry can drive between them. Bunkers are very easy to make and much cheaper than any kind of shed, as they consist simply of stakes driven 18 in. into the ground with three pieces of 6 in. board nailed to them. The board should be fastened on the inside, so that the outward pressure of the manure does not push them loose.

Every third stake is coupled with its opposite number by a piece of fairly heavy-gauge galvanised wire to help keep the bunker walls from spreading. There is no floor except the original earth and the roof is on the principle of a garden frame, sloping outwards. The slope is obtained by using stakes on the inner sides a foot longer than those on the outer and joining them with a rail.

The roof itself is, of course, removable and is made in sections, small enough for easy handling. At the same time these sections must be sufficiently heavy, so that a high wind will not whirl them away, or else they must be hooked down to the bunker itself.

On my own manure bunkers the roof sections cover about five running feet of bunker. They are made of ¾ × 6 in. rough board spaced 4 in. apart and covered with two-ply felt. I admit they are a bit heavy to cope with single-handed, but they stay put in a wind.

Two concrete tracks, each 2 ft. wide, run between the bunkers to make life easier for the barrow-pusher, and as they are the right distance apart they also serve to keep the lorry from getting stuck in the mud in soft weather.

It is quite good business to make things easy for the collector's lorry. It may make just the difference between being able to sell the manure and having it left on your hands when supplies are plentiful.

Egg Packing.

Size of egg packing room will depend very much on the number of cases to be handled each week. My own is 18 × 14 ft. and as many as 40 cases a week used to be sent off when the plant was running full blast, without in any way straining its capacity.

In regard to egg cases, there are always quite a number of " Special " size eggs to be packed, and if these are forced into fillers designed for " Standards " and then forced out again at the packing station, the return will show a larger number of " Cracks."

To get over this, the best way is to use only " Special " size boxes, the extra cost of which will soon be recovered by better packing station returns.

I also strongly advise leather-board fillers. Once again the first cost is greater, but they will outlast the more flimsy fillers and give greater protection to their contents.

I do know, of course, that packing stations make a practice of providing cases to their suppliers, and some packing station cases are quite good.

But, having gone to all the trouble of producing the egg, I want to be as sure as I can that it will reach its destination in good order and condition. I hesitate, in this day and age, to remind anyone that eggs should be clean when packed, and only do so because, in planning the packing room, space should be left for a bench or table under a window for cleaning purposes.

WORKSHOP.

In the workshop there will be wanted a carpenter's bench and tools for ordinary running repairs, and, if my system of spring-cleaning is adopted, space for a few blocks of cages and for creosote dipping troughs. So here, again, size of building will depend on number of birds to be kept.

Assuming the plant is to consist of 600 cages and that the owner intends to spring-clean the whole outfit each year, one block of 12 cages will have to be attended to each week.

I like a fortnight to pass before a clean block is put back into use, as this gives time for the creosote to soak in and dry off.

After bringing a dirty block out of the laying houses it is left in the open for a short spell, say a week. During this time it is partially dismantled and washed down with water and brush. If there should be a good hard rain, so much the better. It is then taken in for cleaning and creosoting.

On these lines, for a 600 cage plant, four extra blocks will be wanted. One in the open, one inside in process of cleaning, and two blocks drying off before re-use. Three spares could easily be made to serve if one concentrated on cleaning and creosoting the dirty block immediately it left the laying house, instead of leaving it in the open in the hope of some unpaid assistance from the weather.

The foregoing covers the question of layout, with one omission: Don't put battery houses too close together. I like a space of not less than 20 ft. between; in fact, my own are 27 ft. apart. Also, don't crowd the end of the house close up on to the farm road. It is better to set the house several feet off the road and widen the hard surface to the house door.

STOCKING UP.

It is generally accepted now that pullets are the better proposition for the original stocking of battery cages and for replacement of losses. At one time some people favoured yearling hens for both purposes, but I do not think many plants are still run on these lines. I may therefore save both time and space by omitting any argument on this point.

I shall not be wasting space, however, in stating as strongly as possible the really urgent need for good stock. I have heard it said, and no doubt in a sense it was true, that culls from flocks at liberty have given good results when put into cages. Obviously such birds are not truly of the cull class; they must have had quality, and the reason they failed in a flock was most likely because they were bullied. Put into cages, they came into their own because the cause of their repression was removed.

The danger lies in people assuming from these special cases that any old cull will develop into a first-class layer if put into a laying battery. This is most definitely not the case.

The fact is that, in battery work as in anything else, you get out what you put in, and if you want good production you must put into the cages birds of good quality.

I read somewhere recently that there was a marked tendency amongst commercial egg farmers before the war, first, to buy the cheapest possible stock, then push it for eggs and disregard mortality, as being the best method of producing a cheap table egg.

This seems completely cock-eyed to me, and, if true, it may in part account for the number of farms which were offered for sale at that time.

Of course, good stock costs more than poor, but a higher egg income and lower rate of wastage will prove that the extra money was well spent.

Furthermore, the supplier, particularly to a regular customer will be keen to maintain quality if he feels he is receiving a reasonable price for his birds.

Therefore, I think it poor business to try to pare down prices to below those ruling for the class of stock wanted.

At the time of writing there is no hurry to get birds into cages at 16 weeks because, on the poor quality foods now available, maturity is later than it used to be. Assuming a return to good feeding-stuffs, I still recommend 16-18 weeks as the best age for the transfer.

Quite a number of pullets lay before they are 20 weeks old, and I like them to be well settled down in their cages several weeks before the first egg. In any case, the birds must be somewhere. Whether they are purchased at 16 weeks or reared from day-olds on the premises, they must be housed.

My own practice with bought-in 16-weeks pullets is to quarantine them for a fortnight, either in a separate battery house or in small wire-floored colonies with veranda attached, before moving them into the laying houses. Home-reared chicks, on the other hand go straight to their laying cages at 16 weeks.

Whether bought-in or home-reared all pullets are deloused with a dab of Black Leaf 40 before being caged.

On the whole, birds keep singularly free of insect pests in cages provided they go in clean. To be on the safe side, they are treated with Black Leaf 40 when moved from dirty to clean cages during spring-cleaning.

Then, again, if any bird is noticed to be lousy when plucked the treatment is applied to the house from which she came. This may happen, say, once in six months, and then out of a house of 500 very likely only a dozen or so may be lousy. But, of course, all are treated as a precaution. A curious thing is that the lousy birds may be spread about all over the house.

It is not uncommon to find one single bird fairly heavily infested, while her immediate neighbours are entirely free. It rather looks as if the louse is something of a home lover, not given to roaming in search of pastures new.

For the first day or two after being caged the birds' droppings may have an unhealthy appearance. This need cause no alarm as the trouble will right itself, and is no doubt due to the sudden change of conditions.

I used to keep my birds on growers' mash until they were moved to laying cages. That is to say, the home-reared birds were thus treated. Bought-in 16-weeks-old pullets were put on to layers' mash when they arrived and got accustomed to the feed during their two weeks' quarantine.

The state of the droppings mentioned above was noticeable with both home-reared and bought-in pullets. It does not appear likely, therefore, that it was due to change of feed, because, while the home-reared bird had a sudden change to put up with when she was transferred to a laying cage, the bought pullet had none, yet the result in both cases was the same.

BEST WAY TO START

Broadly speaking, there are two ways of starting a laying battery plant:

(1) By investing part of the capital in brooding and rearing plant and buying day-old pullets. The advantage here lies in the lower cost of the home-reared pullet to one bought at 16 weeks. Always provided, of course, that the battery man knows how to rear. If he does not, his home rearing will prove a most expensive business.

A later chapter deals with the mechanics of chick rearing. Here it is sufficient merely to refer to home rearing as an alternative to 2.

(2) By buying in 16-weeks-old pullets. The advantage under this method is that all available capital can be invested in laying cages and the whole energy of the owner be devoted to his real job of egg production.

Personally, I favour the second method in ordinary times, but it would be quite impossible to carry out now because of the high price commanded by the 16-weeks pullet. It is impossible to say what things will be like in the future. Unless the cost of a 16-weeks pullet has some relation to the sale price of a boiling hen, method (1) will have to be adopted.

In this case, the question arises as to what rearing capacity is required. There is no need to concentrate all the rearing into one short period each year during which the total requirements of the plant have to be raised. Instead, by spreading the rearing over the whole year or at any rate over ten months, a much smaller brooding and carry-on plant will be wanted.

The objection is that the laying plant cannot be started up full blast, but must be built up by degrees. On the other hand, once the laying plant is in full operation the smaller brooder capacity will be fully employed keeping things going, whereas a large brooder plant capable of quickly filling the laying cages will then be idle for a large part of the year.

Assuming the purchase of 100 day-old pullets monthly for ten months, and allowing for rearing losses and culling in the cages of poor producers, there might be left in the cages at the end of a year dating from the caging of the first batch at 16 weeks, some 500-600 birds. Their ages would range from 16 months to six months. It is impossible to be definite as to the number because so much will depend on the quality of the day-olds originally, the skill in rearing and the ideas of the owner as to what constitutes a poor producer.

On this basis, which, I emphasise, is only a rough guide, a 500-600 cage plant will call for the installation of brooding and rearing capacity of 100 day-old pullets monthly. But this is only part of the picture. There is also the question of how many birds, if any, can be carried through for a second season's laying. If 50 per cent. of the first season's stock were worth keeping, then the laying plant could be further increased without any corresponding enlargement of the rearing outfit. Alternatively, fewer chicks need be reared to maintain the original laying plant in full occupation. This question of cage stocking is gone into in greater detail later on.

Does it Pay to Rear or Buy Pullets ?

Reverting to method 2, of stocking the cages by buying 16-weeks-old pullets : The whole plant can be filled up in one go. Instead of spreading it out over a fairly long period. Initial outlay for stock will be greater, but returns will be coming in very much sooner.

The main point is : What is the difference in cost between a bought 16-weeks pullet and one reared at home from day-old ? There must be a profit for the seller of 16-weeks pullets or he could not stay in business. Therefore the home-reared pullet should be cheaper, and barring bad luck, it is.

It is quite useless to quote present-day figures, and equally unprofitable to guess at the future, so I must go back to pre-war for a safe comparison.

In those days I figured to rear a pullet from day-old to 16 weeks for 3s. 6d., whereas I could buy them at that age for 5s. delivered at farm. Really good quality.

The home-reared pullet showed a saving of 1s. 6d.; or, in other words, the capital invested in brooder plant, etc., enabled me to increase the profit by 1s. 6d. per layer if the turnover of laying stock was on the basis of 100 per cent. per annum.

If, instead of using capital to install brooder equipment, more laying cages are put in, will the profit from the extra layers compensate for the 1s. 6d. additional cost of the bought 16-weeks pullet ? Probably not quite in cash, but the adverse margin will be a small one, and, I think well worth accepting in the interest of the main job of egg production. To get the best out of laying cages requires concentration, like any other job, and chick-rearing can prove too much of a diversion.

Within a few weeks of the cages being filled, or even within a few days, culling should start. In the early days it may be only one bird every now and then which must be discarded, but after a short time there are bound to be vacant cages which should be filled up again.

I wish I were able to state definitely the percentage of vacancies which may be expected in a given time. This is not possible as conditions are too varied. Say the original stocking of cages took place in July, I would suggest booking for delivery three months later about 5 per cent. of the original purchase. This will fill most, if not all, of the vacancies, and by that time the owner will be getting an idea of what his wastage is likely to be.

Culling should go on all the year round, and I will go into the question in greater detail later on. It is sufficient here to refer to it and point out that in late summer and early autumn, when moulting is at its height, the rate of discard is much higher, and replacements should be arranged for accordingly. This applies in lesser degree if birds are to be kept for a second season's laying.

As to whether it will pay or not, in the future, to keep birds for a second season is a question which can only be answered when the then cost of bringing a pullet into lay can be compared to the then selling price of a boiling hen. Pre-war the difference was small enough to warrant 100 per cent. replacement each year. Today the cost of laying pullet is so much greater than sale price of boiling hen that it does pay to keep them for a second season.

How long this state of affairs will continue it is quite impossible to say. Price of eggs must also be taken into account, because a bird lays less in her second season, and this drop in production may tip the scale in favour of annual replacement, should the price of eggs be high enough. At present it certainly is not.

To sum up. On prices as they were pre-war, or with prices having the same relation to each other as they had then, I favour disposing of birds at the end of one season's laying. As things are today, it appears advisable to retain suitable birds for a second season.

BREEDS.

Judging by the number of times I have been asked about it, the question of which breed or cross to use in batteries is a matter which exercises the mind of most beginners.

Personally, I favour R.I.R. × L.Sussex or L.Sussex × R.I.R. Both lay brown eggs and make excellent boiling fowl when the time comes. Neither cross is unduly broody, and both are quiet and not prone to sudden alarms.

I have used other crosses, such as R.I.R. × W.Wyandotte and Buff Rock × W.Wyandotte with equally good results, and am no doubt influenced in my present choice of R.I.R. × L. Sussex by the fact that I have an excellent source of supply.

In America the W. Leghorn is much favoured for battery work. Partly, perhaps, because in that country the white-shelled egg is so popular. I have tried a few of this breed and also two varieties of Leghorn × Heavy, but without any great success.

Light breed blood seems to make the birds too flighty and nervous for battery work. In spite of which, I do know of plants in England which are stocked mainly with light × heavy crosses. Perhaps, therefore, my own lack of success was due not so much to the light breed blood as to lack of quality in the parent stock.

There does not appear to be any point in using pure breeds in cages. They cost more, to start with, and taken all round, I think, are slower to mature, which makes them still more expensive by the time they are in production. The only advantage which could be set against this extra cost would be if battery birds could be bred from. I am against any such practice.

Once a bird is caged she should be regarded as solely a producer of table eggs, and when no longer a source of profit in that capacity she should be sold for table. I admit this view is not based on definite knowledge. It would take several years' experimental work to find out for certain.

Until such work has been done I take it for granted that one could hardly expect to effect any improvement in stock quality by breeding from battery birds, and therefore it is best left alone. Stock quality is none too good as it is, so there is little point in taking any sort of risk of making it worse.

The domestic hen is not a particularly brainy creature, but I think she is sensitive to atmosphere. An attendant who feels friendly towards his birds, and when handling them treats them gently, will get better results than one who regards his charges as just a job to be got through as quickly as possible.

Good stock well treated used to show a very reasonable profit before the war. One cannot say what the position will be in the future, nor how long the transition period will last. But if the poultry industry in general is to flourish at all, prices will have to be adjusted to show a worth-while margin for the average egg farmer. In this case the battery should do well, as it is the most economic method of producing the table egg.

ROUTINE.

In planning the programme of work on my own plant, I have kept two points in mind.

First, that every bird should receive some sort of attention each day. They like seeing their attendant about the house as is very evident from the way they greet him. Also trouble is more readily spotted if every house is worked in each day.

Secondly, routine work should be so balanced that there is not too much work one day and not enough on another. It is better, too, if there is a small margin of time to spare each day. Then, if normal routine has been upset for any reason, the day's work can still be got through before knocking-off time. If everything has run to time there are always small odd jobs to be done in the odd half-hour at the end of the day.

On an ordinary poultry farm where birds and plant are spread over a largish area, a good deal of time is spent getting from one job to another and the work is more diverse. It is different with a laying battery. The work is largely of the repetition variety and it is all in one place.

The advantage, so far as getting through the work is concerned, undoubtedly lies with the battery. But, working steadily at full pressure, it is certainly more tiring. In factories eight hours is considered a long enough day. Longer hours, except for short periods, do not show better results. This principle might well be applied to battery work.

In the days before the war, when I had a staff, they worked an eight-hour day with Saturday afternoon and Sunday off, and we got through the work very comfortably. Turns were taken for the Sunday work of attending to growing stock, which worked out at from one to two hours every third Sunday.

Cleaning droppings-trays is done once weekly. (If mechanical cleaners were used this would be a daily job). The tray is withdrawn and scraped off into an ordinary barrow with pneumatic tyre. I do not recommend scraping too heavily, if a film of manure is left so much the better as it protects the galvanising from the edge of the scraper. During this operation, note the condition of the droppings for the first sign of anything going wrong.

Feeding dry mash only, was done twice weekly before the war. Now, owing to the very inferior quality of feeding stuffs, this job has to be attended to three times in the week. The advice so often given in respect of wet mash, that enough only should be fed for the birds to clean right up in a stated time, does not apply when feeding dry.

It is all right for the birds to pick the bottom of the trough clean occasionally, but not too often. Once the mash level is so low that the bird cannot get a beakful at a time, picking up the residue becomes a pretty slow process, and by the time she has succeeded she will be getting hungry.

As a rule, therefore, there should be a certain amount of mash left when the trough is due for refilling. To prevent an accumulation of stale mash in the bottom, the trough is tilted smartly towards one end before being refilled. The tilting is done towards alternate ends on alternate feeding days.

Some birds eat very much more than others and consumption is not necessarily high with rapid producers and vice versa. The same remark applies with even greater force to shell-forming material. I now use pullet-size limestone grit fed in separate compartments of the food trough, and it is extraordinary how much some birds will put away, while others are barely interested in it.

To save a special trip with limestone, a small box of it is hung on the side of the food truck and distributed where needed while feeding.

Except during an experiment some years ago to find out if there were any advantage in feeding corn, none is, or has been, fed to birds in cages. There is no benefit to be derived from corn feeding, only the disadvantage of having an extra job to do and one, moreover, which would have to be attended to daily, Sundays included.

WATERING was a bi-weekly job, but has now to be done an extra time per week. Once weekly the two-bird water boxes are emptied, scraped and refilled. On the other two occasions they are merely filled up. It does not matter whether water troughs or boxes are placed high or low, mash will still get into them off the birds' beaks.

Some birds are extremely adept at transferring mash from feed trough to water box, and in days of food shortage something has to be done about it. The most obvious method has proved the best. The water remaining in the water box is poured off, leaving the mash in the bottom of the box, which is then replaced for an hour or so before being cleaned out. Even so there is a certain amount which is not eaten and this goes to help feed a neighbour's ducks.

The actual process of water-box cleaning is very simple. They are dipped into a 20-gallon water cart half full of hot water, given a rough scrape inside and put back. When all have been cleaned another water cart goes round and they are refilled by being dipped into it.

EGG COLLECTING is a daily job except Sundays. In severe weather it is a good plan to pick up on Sunday as well and to arrange the daily collection as late in the afternoon as possible so as to avoid eggs lying in the house overnight.

In the ordinary way, however, Sunday's eggs can quite well be collected on Monday so as to have as little to do as possible on the Sunday. At one time I used to collect only twice a week, but the eggs got too dusty and, if there were an egg eater, she had too good a chance to do her stuff.

Each hen has her own record card affixed to her mash trough. The card covers the full 12 months and is used for recording details of broodiness, etc., which together with her egg record may help when culling.

The only other item of routine on my plant is spring-cleaning, which, as explained earlier, is done in small packets throughout the year. As I have already gone into this question there is no object in giving another explanation here.

All work in a laying battery house should be done as smoothly as possible. The birds have no objection to a steady noise nor to rapid but steady movement. But they do resent sudden crashes and bangs and particularly people suddenly darting past their cages or waving sacks and buckets about.

As I have said before, most battery work is doing something many times over. A good deal of time and fatigue can be saved by a careful study of one's movements and the working out of a rhythm which should include feet as well as hands.

ACCOUNTING

BIRD-LAY SYSTEM.

Later on I shall be giving details of food consumption and egg production per bird, but before doing so, must explain the method of calculation if the figures are to be clear.

Unfortunately, there is no generally accepted form of poultry farm accounting. In fact, to make a comparison between results published by two different sources, usually calls for quite a bit of arithmetic to iron out the discrepancies between the methods of presenting the figures.

In normal times, when my plant is in full operation, new pullets are being put into the cages for about 10 months in the year. In consequence, almost every day several pullets lay their first egg. Culling is continuous all the year round so that a varying number of birds are sold off for table each week.

As a result the actual number of laying birds is never constant, in fact, it fluctuates quite considerably. It would be useless, therefore, to take the number of layers at the beginning of the year, or at the end, and use this figure to calculate the quantity of food eaten per layer, or, indeed, to arrive at any accurate figure in relation to other costs per layer per year.

There is only one really accurate way of calculating the number of layers, and that is on the bird-day system. It is quite simple and requires very little time each day as it only calls for the recording of deaths and sales of layers and the number of pullets laying their first egg each day.

My own method is to enter such information on the " Daily Report " deducting from the stock column the number of sales and deaths and adding thereto the pullets newly in lay. At the end of the month the stock column, totalled and divided by the number of days in the month, gives the average number of layers for the month.

At the end of the year the monthly averages, added together and divided by 12, gives the average number of layers for the year. Personally, I begin my year on January 1st, because with all-the-year-round replacement there is no advantage in taking any other date, but the system can be worked in exactly the same way no matter what is adopted as the starting date.

Having once established what is the average number of layers for the year, accurate figures on food consumption, egg production or any other item of interest can be worked out.

DATE.	EGGS LAID.	LAYERS.				GROWING PULLETS IN CAGES. 16 weeks to 1st Egg.					COLONY HOUSES. Pullets 8 to 16 weeks.					BROODERS. Day-old to 8 weeks.			
		Into Lay.	Sold.	Dead.	Stock.	From Colony Houses.	First Egg.	Sold.	Dead.	Stock.	From Brooder	To Cages.	Sold.	Dead.	Stock.	In.	To Colony Houses.	Dead.	Stock.
March 31 ..					784					182					176				90
April 1 ..	428	6			790		6			176			2		174			1	89
„ 2 ..	396	4	7		787		4			172					174	100			189
„ 3 ..	401	3			790	85	3			254	88	85			177		88	1	100
„ 4 ..	413			1	789					254					177				100
„ 5 ..	417	9	3		795		9	1		244					177			2	98
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T

What the Columns Mean

A. Date of month.
B. Daily egg collection.
C. Pullets laying first egg from Col. H.
D. Sales of culls, etc.
E. Dead and unsaleable culls.
F. Daily stock total of layers arrived at by adding Col. C. to preceding day and deducting Cold. D and E.
G. Pullets moved into laying cages at 16 weeks from Col. M.
H. Pullets laying first egg. This figure transferred to Col.C

I. Sales of culls, etc.
J. Deaths or unsaleable culls.
K. Daily stock total of growing pullets in laying cages arrived at by adding Col. G to preceding day and deducting Cols. H, I and J.
L. Moved to colonies from brooder. Figure transferred from Col. R.
M. Pullets moved to laying cages at 16 weeks. Figure transferred to Col. G.

N. Sales of culls, etc.
O. Deaths and unsaleable culls.
P. Daily stock total arrived at by adding Col. L to preceding day and deducting Cols. M, N, O.
Q. Chicks received from breeder
R. Eight weeks old chicks moved to colonies. See Col. L.
S. Deaths and culls.
T. Daily total arrived at by adding Col. Q to preceding day and deducting Cols. R and S.

It is a great pity that this method is not universally in use because then the comparison between one's own and other people's figures would be easy and accurate and provide a pointer to economies which one had overlooked.

I commend this to the advisory economists if ever they propose a national poultry farm survey.

DAILY REPORT BOOK.

This shows how a daily report book can be arranged to give a complete picture of what is happening in a laying battery unit from the chick brooders to the cages.

FOOD.

There is an obstacle to absolute accuracy in the bird-day system. With flocks, when a batch of pullets begins to lay, some will be layers while others have still some weeks to go before their first egg.

In batteries also the same trouble arises where a layer and a maturing pullet are feeding from the same trough. At least with the battery there is no doubt as to the number of birds in lay—they can be counted if necessary.

But with layers and non-layers eating from the same trough it is impossible to know how much is consumed by layers and how much by birds which have still to make their first contribution to the egg basket.

To get over this, some years ago, I housed several batches of pullets separately and kept a note of the food eaten. From the date of caging at 16 weeks to the time when production covered cost of food, their consumption was just over 13 lb. per bird. For convenience I call it 14 lb.

It is a very easy matter to keep separate the food of growers from day-old to 16 weeks, as they are housed quite apart from the layers.

Therefore, if the 14 lb. referred to above be multiplied by the number of pullets which come into lay during the year, and to this result is added the food consumed by growers to 16 weeks, the final result is the total quantity of food eaten to maturity.

If this figure is then deducted from the total quantity of food used on the whole farm, remainder will be the amount eaten by the layers only. That is to say, it will be so on a plant where there is no other stock beyond the layers and growing pullets.

I admit that the above is not dead accurate, but if birds are always caged at the same age and 14 lb. is adhered to all the time, the margin of error will be constant. This being so, it will be possible to compare one year's results with another with some feeling of assurance.

In case anyone should adopt the above figures without first testing them out, I must add that the tests were made before the war. Feeding stuffs in those days were quite a different matter to the stuff we get now. Today, at least 28 lb. will have to be allowed for the period between 16 weeks and maturity. Also, the quantity eaten up to 16 weeks is very much higher.

In fact, I have been so alarmed by the enormous quantity of food eaten in these days that I carried out a special test. Until 16 weeks the food eaten by 100 day-olds was weighed in the usual manner, and after being caged the weighing continued.

The difference in this new test is that each bird in the cages has her own trough, so that there can be no confusion between them as they start laying.

As each bird starts to lay she is no longer fed out of the weighed food, but gets her supplies from the layers' store. Those which have not yet laid are still fed from the weighed-off feed. Eighty-eight birds were caged at 16 weeks, and six have still to lay, so the final result cannot be given. Assuming the six start production within a reasonable time, consumption will be over ½ cwt. per bird from day-old to maturity. In pre-war days the equivalent figure was 33 lb.

The only reason which can be advanced for this enormous increase is the poor quality of present-day feeds. The future may see an improvement in quality, but it is highly improbable that this improvement will be anything more than a step in the right direction.

We shall very likely have to wait some considerable time before we get back to the old standards.

In the meantime we may expect our pullets to eat somewhere round 56 lb. from day-old to first egg, the quantity gradually decreasing as feeding stuffs improve. Since the above was written the test has been concluded. Final figure was 59 lbs. of food per pullet from day-old to first egg.

CHICK FOOD.

All my chicks are reared from day-old to 16 weeks first in wire-floored brooders and then in colony houses with wire floors inside and wire-floored verandas outside. Thence they go to the cages.

For the last two seasons the colony houses have been dispensed with and a battery house fitted up into compartments to take their place. These compartments are also wire floored. I mention this to emphasise the fact that the food quantities referred to in the previous issue are not made up in any way by what the chicks can pick up for themselves, because they have no chance of picking up anything at all.

I don't think that chicks running out really save their owner anything in food. What little they do pick up is probably insufficient to offset the energy used in finding it. I have not tested this out in practice, but I do know that when I changed from running laying flocks at liberty to the ordinary intensive system, the quantity of food eaten per bird did not increase.

I find that battery-housed layers eat more food at any time than those kept under more orthodox conditions. But in view of the greater egg output, this is hardly surprising. Provided the quantity eaten per dozen eggs produced is less, that is all that really matters.

Layers, just the same as growing birds, eat far more today than pre-war, as the following figures show. The consumption per bird is for the full twelve months based on the average number of layers for the year.

Year.	*Food per bird.*	*Eggs per bird.*	*Food per dozen.*
1939	110 lb.	196	6.73 lb.
1944	154 lb.	181	10.21 lb.

Comparing the above figures, consumption per bird is higher by 40 per cent., production is down by 7.65 per cent., and food per dozen eggs produced is up by 51.7 per cent. in 1944 as compared with 1939. I should add that I am still feeding on dry mash, so none of this very marked increase in consumption is due to extra moisture.

A point in this connection which is sometimes overlooked is that all this extra food means extra work.

In fact, I take a very poor view of war-time feeds, and shall revert to pre-war mashes as soon as they can be got. Certainly general health is good today but I don't think it so very much better than it used to be. Therefore I do not intend, as do some poultry farmers, to continue in peace-time with war-time feeds.

CULLING

Culling has one thing in common with ventilation. Everyone says how important it is, yet with quite a number of people that is as far as it goes.

Their idea of culling is to remove only such obvious duds as are evidently on the verge of death anyway. I can sympathise with the man who puts the job off if he has first to herd all his birds into a corner of the run and then try to keep them from dodging between his legs while he tries to pick them up one by one. A thankless job, and, in any case, not the proper way to tackle it.

Also, I feel deeply for the culler who spends part of his hard-earned evening rest handling birds on the perch after dark. How very much easier it is to attend to this most important business when the birds are housed in laying batteries.

It can be done thoroughly at any time, either a few birds or a whole house at one go, and if doubtful ones require another look in a day or two, there is not the slightest difficulty in finding them again without disturbing the rest. In fact, the battery man has no excuse if he omits to cull regularly.

If the owner does all his own work, culling can be combined very largely with the day's routine. If a staff is employed, one person should be responsible for culling and all birds and droppings trays be looked at by him at least once weekly. Also, the other members of the staff should report to him if they notice any bird looking off colour.

To simplify matters, I am going to divide culling into two heads: 1st Removal of duds; 2nd Culling on egg production.

Removing the real duds is easy enough, what one wants to do is to pick them out while they are still in saleable condition for table.

For this purpose the condition of the droppings frequently provides the first evidence of anything wrong, although the bird may be looking perfectly fit, eating well and still in lay.

Thin watery droppings may be viewed with suspicion, but the bird need not be culled immediately, as this condition very often precedes the moult. Also, it may be due to extra salt in the ration.

With properly mixed food this should not happen, but it may do, so note the bird's number and keep an eye on her. Heavy drinkers naturally produce watery droppings, as has been only too evident on war-time mashes, but it does not do to try and effect a cure by rationing the water supply. I have tried this, but it just does not work. If the bird wants a lot of water and does not get it she will not do her part in egg laying.

Green slimy droppings almost invariably indicate an early death. But here again, if the bird is spotted and plucked at once she may be quite all right for table. Naturally, one does not want to market stuff that is unfit for consumption, so I have an arrangement with the poulterers who take my output to throw out anything which proves unfit when drawn.

Very few indeed have ever been rejected, though of course I do not send in stuff which is obviously unfit when plucked. If, coupled with green droppings, the bird is not eating or only eating very little, she is culled immediately.

If still eating more or less normally she is watched for a day or two before the decision is made. One point is worth noting here. It is possible for a food trough to be missed when the food truck goes round. If this happens and the bird is without food for a couple of days, her droppings, what there are of them, may be easily confused with the green slimy ones just mentioned.

To this I add that no trough ever should be missed at filling time. The birds cannot get anything for themselves, and it is decidedly up to the attendant to see that they are never short.

There are other varieties of abnormal droppings. The white portion may be chrome yellow. This condition clears up as often as not, but if it gets more pronounced the droppings become thin and slimy, with the yellow taking the place of the green colour. The bird should be culled, and one need not wait longer than to be sure that the droppings are becoming more liquid. So long as they remain fairly firm and the bird is eating she may be all right.

A beginner may easily confuse a broody's droppings with something more serious. The colour is right, but the consistency is not. Also, the volume is far below normal, and the bird eats very little.

In most cases no mistake can be made if the bird is looked at as she will puff out her feathers and make the hideous noise of a broody. But the slightly broody bird may stand up at the attendant's approach and remain silent, but she will usually sit again as he passes on. In this case have a look at her from a distance.

Culling on production, the second of the two divisions of culling must itself be divided in two. These sub-divisions are (*a*) pullets coming into lay and (*b*) general culling.

(*a*) In the days when feeding-stuffs were of good quality, one expected pullets to start laying and continue doing so without any funny business except a few soft shells here and there.

Some pullets would lay a few eggs and then stop, although continuing to look and handle as if in full lay, but they were a very small minority, so, unless pressed for cage space, I used to keep them, as they usually turned out quite well after a time.

Today the number of bad starters is very high, and I can think of no other cause than inferior feeding-stuffs. They lay an egg or perhaps a couple of dozen and then stop. They do not necessarily go into a moult, though some do. They just don't lay, some for a few days, others for a couple of months or even more.

I have tried in vain to discover some sign which will indicate how long a holiday the pullet is likely to take, because it might pay to discard the long-distance ones.

In the absence of any such sign one can only decide either to discard all bad starters or keep them all. In the great majority of cases they lay almost as well as pre-war once they come back into production, but the time wasted while taking a holiday means a lower yield for the year.

In fact, I think this is the principle cause for the drop in average egg output, as shown in the figures given comparing consumption and production as between 1939 and 1944.

This particular trouble will probably become a thing of the past when foodstuffs return to normal, I mention it now because the improvement in food quality is likely to be gradual, and therefore the trouble will continue in the future, but in lessening degree.

If, having started up again for the second time, the pullet takes another holiday after laying only a few eggs, then she should go to the pot. I make only one exception to this, and that is, if it occurs just before the normal glut season. There is a very good chance in that case of the second holiday being short and the bird giving two or three months' good production.

This bad starting is not peculiar to my own plant.

(*b*) In addition to the regular inspection of birds and droppings-trays there must be a periodic examination of record cards with the object of eliminating the poor producer. But what is to be looked upon as poor production ? This will depend on whether the policy to be adopted is :

(1) High-level output (185-195 eggs per year), necessitating complete replacement of stock each year.

(2) Low-level output (150-160 eggs per year), with a much lower replacement cost, as a large proportion of birds can be kept for a second and some for a third year's production.

Not being a prophet, it is impossible for me to forecast which alternative is likely to prove the more profitable in the future. As matters stand today, I favour adopting a combination of the two, that is to say by retaining the best pullets only for a second season and aiming at an average output of 180 eggs per bird.

In this case culling on production is fairly simple during the birds' first season. So many of their sisters will lay well over the target figure that a few 150 eggers will still leave the pullet average above the desired level. This surplus will help to bring up to scratch the lower output of the second-year birds, I should therefore be lenient with the first year holiday-maker and only discard her for physical disability, such as water-belly or a hard lump of fat between the pelvics or any other reason which precludes her from laying again.

This is not in accordance with the policy I have adhered to hitherto, but with prices bearing no relation to costs, complete annual replacement is no longer worth while. At the present time there is no profit in egg production anyway, but the halfway house between high and low output policy appears the more promising.

As regards selecting birds for a second season, I should discard any with a first-year record of under 180, unless she happens to be one of those which made a bad start and then laid at a good rapid rate. On the other hand, it would be unwise to retain high-record birds solely on the ground of record. Some of these will undoubtedly be of the sprinter type. Splendid for a season, but with no guts for a second. Usually the birds which prove most satisfactory in their second year are those which have been steady layers of 180 eggs and over. By steady I mean regular producers rather than spasmodically rapid layers with longish breaks between. Last but by no means least, be sure the birds retained are in good condition and up to weight.

MOULTING.

There is no need to give moulters any different attention.

Some battery owners turn them loose until they show signs of reddening up again. I do not because, even if I wanted to, there is no space for them. If there were I don't think I should do it because it would mean a departure from the regular routine, and I cannot see much advantage to be gained.

However, if the moulters are given their freedom, they must be ringed for identification, or, when re-caged, their previous year's record will be lost.

The length of time any individual bird will take over moulting cannot be guessed at. I have had one which laid again within two weeks of dropping every feather. At the other extreme was one which spent seven months over the job and then had her neck wrung because I lost patience. Very often they take two bites at the cherry. Having partially regrown her feathers the bird starts laying. She may continue for a week, or month or maybe six months, then stop laying and put the finishing touches to her feather growth.

Such are not the general run, but are numerous enough to deserve mentioning. It is rather disappointing when, within a few weeks of finishing her moult and getting back to business, the bird goes in for what appears to be another moult. But if she is examined it will frequently be found to be not another moult but the continuation of the first.

Excluding the freaks, moulting will vary from 10 to 14 weeks. At the beginning food consumption will be markedly less than normal, the bird's appetite growing with her feathers, until a short time before she lays, she will be once more eating her full quota.

Some of the birds retained for a second season will prove disappointing. After moulting they will not lay well enough to pay for their keep. They should be discarded, but before throwing them out it is a good idea to examine their wings and make certain that the moult is really finished. If the quills are fully grown cull the bird.

But it may be found that some quill growth has yet to be made in which case give another chance. When the quill growth is finished she should step up her production and probably will.

I always keep a list of slow layers to have them specially under my eye. Then, if cages are wanted for young pullets or the rations are running a bit short, I know where to find birds which can be got rid of without incurring any loss worth mentioning.

Earlier on I mentioned retaining some hens for a third season. I have only one rule for this. The hen must continue laying into December in her second year, she must be in good condition, and her second season's production be not less than 180.

THE HOLIDAY HEN.

No doubt the time will come when the feeding stuffs situation will improve, both in quality and quantity, and commercial pullets will again be obtainable at commercial prices.

Then, provided the price of boiling fowl is good enough, it may very well pay to revert to the high-level output. I may as well say here that the higher one sets the annual average output per bird, the greater will be the rate of culling, and therefore larger numbers of replacements will be called for to keep the cages full.

For instance, if to secure an average of 160 eggs per bird requires 75 per cent. of the stock to be replaced each year, raise the aim to 190 per bird, and the probable replacement rate will be in the region of 125 per cent. That is to say, the average laying life of the bird will be about nine months. These percentages are not meant to be taken literally, but merely as illustrations.

Some pullets will lay straight through for 18 months or more without a break. Others for only a few months, at the end of which they may take a holiday for no apparent reason or indulge in a neck moult. For high-output work it does not pay to keep birds through a full moult; their second season is hardly ever so good as the first, and therefore their cage will be more profitably employed in housing a pullet.

I do make exceptions to this rule, because, on my system of growing pullets being available all the year round, there are always bound to be some quite young birds, starting to lay out of season, which carry the neck moult too far and go in for a full one instead. With such I am more lenient, and, if they have laid well and steadily, keep them unless cage space is short.

The biggest difficulty lies amongst those birds which, though neither broody nor in moult, yet fail to pay for their keep. The genuine slow layers, those turning out a few eggs, but doing so regularly, are kept if they more than cover their food cost. They form a nice reserve which can be got rid of immediately if cages are wanted or there is a demand for boiling fowl.

It is the holiday-maker which gives one the headache. Ever since starting battery work over ten years ago I have tried to find some means of distinguishing for certain the holiday-maker from the bird which, though in perfect health, has struck work for good. I am still looking, but do not think the search will be successful.

On the one hand, one does not want to discard a potentially good layer, and, on the other, it does not pay to continue feeding a real striker for an indefinite period. It is easy to set a limit of, say, a month or a fortnight, but by adhering strictly to any limit one may throw out a holiday-maker just a couple of days before she proposes to lay again. Of course, handling helps, but it does not provide the complete answer, because strikers very often handle as if they are in lay when, in fact, they are not and never will be.

The only thing to do is to accept the fact that one will make mistakes; they cannot be avoided, but practice will reduce the number.

It is a good plan for the beginner to retain a number of birds of which he is doubtful and see from their subsequent behaviour how far out he is in his estimate of their future capabilities.

The time of year can be of considerable assistance in making a decision.

The bird taking a holiday in February can be retained, because, with the near approach of the glut season, there is a good chance of it resuming production after only a short rest.

The contrary holds good for a bird taking her holiday in August. By the time she is ready to resume operations the regular moulting season will be near, so that instead of laying she may decide to moult.

The foregoing may not be very helpful, but it is better than laying down hard-and-fast rules which are likely to prove incorrect. That is one of the difficulties with livestock. We humans may work out how they are likely to behave on the average, but as individuals they each do as they please, and are quite unconcerned if their behaviour is the opposite to what is laid down in the book of rules.

MORTALITY

Health in laying batteries is very good, witness the rate of mortality, which was 10 per cent. pre-war and 5 per cent. for 1944. There is probably some justification for the arguments that present-day foods, being less concentrated, put less strain upon the birds, and therefore health is improved. I do not think that this accounts for the whole of the drop in mortality last year. With only a few hundred birds to watch instead of a few thousand, there is far less chance of missing anything.

Mortality includes any deaths which may occur, and also any birds which are unfit for human consumption when killed. I must add that the percentages given above are on the average number of birds kept for the full year. If calculated on the number at the beginning of the year or on the number put in during the twelve months, the death rate would appear much lower.

During the past ten years or more I have had no trouble from disease of any sort with the exception of three outbreaks of colds. The last two attacks were treated with Deosan (blue) and cleared up without any beak-squeezing or head-dipping—a tiresome and dreary process. For the past three years it has been the regular practice to add Deosan to all drinking water, and colds have ceased to trouble me.

I do not pretend to be a poultry doctor. If disease should break out it would appear to me much better to call on the services of someone who makes this sort of thing his life work. There are only two things I make any attempt to treat—prolapsus and swollen crop.

Swollen Crop I never try to treat surgically. The birds get nothing in the way of fibrous grass, so it is extremely unlikely that the trouble is caused from any accumulation calling for removal with the knife. If the contents of the crop is sloppy, water and food is withheld for 24 hours and progress noted. If there is then a distinct improvement, the bird is given a very small feed and a drink and left again for another 24 hours.

If no improvement is discernable she is neither fed nor watered. After all, so long as the crop is full and the contents not passing on, what good can the bird derive from merely aggravating her condition ?

If the swollen crop feels too firm, food only is withheld; but water is given to help soften things up so that the crop will have a better chance to empty itself in the normal way.

If there is no improvement after 48 hours the bird had better be culled.

If, when the swollen crop is first spotted, the bird is also in an emaciated condition, no attempt is made to cure her. She is better dead.

Swollen crop is not a very frequent source of trouble. The above method works in about 75 per cent. of the cases which do occur. I do not pretend to know the reason for it, but suppose it is some sort of tummy upset which results in a hold-up lower down. If it were due to some physical disability, one could hardly expect the mere withholding of supplies to rectify the trouble.

PROLAPSUS almost always occurs with young pullets, mostly with their first egg, and, in my experience, the number of cases is very few. Sometimes the egg is normally shelled, but usually is either oversize or soft-shelled.

The first thing to do is shift the egg without breaking it. If the case is spotted at once, getting the egg away is comparatively easy. It gets more difficult the longer attention is withheld.

After a short time the protruding part becomes crusted with excreta, and this must be soaked off before trying to get the egg away. Also, the longer the bird is left unattended, the more she strains and the worse she gets.

After removing the egg I replace the part, but am never at all surprised if the bird immediately ejects it again. In fact, she nearly always does. So then I put her in a cage by herself and give her water but no food for 24 hours.

The water helps to keep the protruding part damp and prevents the crust forming. In 24 hours she will have evacuated what food she had previously eaten and will have less to strain with when the part is replaced. This should be done after again soaking away any crust which has formed.

Again, the bird may refuse to retain herself, in which case I give her a little food and leave her with her water for another 24 hours. This treatment is successful with about half the cases which occur, excluding such bad ones as are obviously not worth attempting.

I do not try to cure the very bad ones, but wring their necks at once. The incidence of prolapsus is really quite low, about 1 per cent. of the pullets coming into lay during the season.

STARTING WITH DAY-OLDS OR 4-MONTHS PULLETS

Today specialisation is very much to the fore, but the term does not always convey the same meaning to different people. Some folk regard a breeder-cum-table-bird-cum-commercial-egg-producer as a specialist. So he is in the sense that he specialises in poultry.

But that sort of farm is not really a specialist undertaking; it is more accurately described as a General Poultry Farm.

True specialisation really means concentrating all efforts on one aspect of the business, as a breeder, hatchery, table bird producer, pullet rearer, or commercial egg man.

I am quite convinced that it is on these lines a thoroughly successful poultry industry can be built.

At the moment, however, conditions are far from normal and will probably remain so for some time to come. It is not for me to make suggestions on breeding, hatching or table bird work as they are quite outside my own line.

But so far as the commercial egg is concerned I do feel entitled to express an opinion.

In spite of the preceding remarks I do not think it is an economic proposition at present to confine one's activities solely to egg production, because the cost of the 16-weeks-old pullet is too high compared to the sale price of boiling fowl. Even to hope for a profit one must undertake rearing replacements from day-old pullets.

Commercial egg farmers who have managed to stay in business during the war years must have solved this problem in order to have survived. I am more concerned with possible newcomers to the ranks.

Present-day prices of rearing equipment are very high and probably by waiting a while better quality appliances will be obtainable for less money. Or possibly during the same interval the 16-weeks pullet may drop in price or the price of boiling fowl be raised.

If the intending egg farmer is content to put in a year or more learning the job on someone else's farm, so much the better.

When ready to start on his own he will be better equipped to judge the position as it will be then.

There are bound to be some people who wish to start right away, or as soon as they can arrange about foodstuffs, and they are going to be in something of a dilemma if they wish to be thorough-going commercial egg specialists.

By putting in brooders and so forth at the start the farm will be saddled with rearing equipment which will not be wanted any more when 16-weeks pullets can be bought reasonably.

Of course, the equipment can be sold at a loss or retained against possible future eventualities. But this means capital lying idle for an indefinite period, possibly permanently.

The other alternative is to buy 16-weeks pullets for the first season, or maybe two, accepting in advance the fact that there will be a big drop between cost price and subsequent sale when their useful laying life is ended. If this loss were to prove less than the cost of rearing equipment it might be the better alternative.

The farm would be got going, there would be no redundant equipment, but, if pullet prices did not fall within the expected period, then the position would be a bit grim.

INTENSIVE REARING

To those who prefer to start doing their own rearing I suggest consideration of my own methods, which, it must be clearly understood, are intended solely to produce laying battery replacements.

The whole job is carried out on wire floors from day-old until the pullet is put into her laying cage, hence no extra ground is required for rearing.

In fact, the equipment can be installed in a house suitable for laying batteries so that, when it is possible to buy 16 weeks pullets, the rearing plant only need be disposed of and the house put to its proper use.

Some partitioning would be needed, as it is unsound to run day-old chicks and part-grown pullets in the same room.

My own brooder house is 80 × 14 ft., 6 ft. to eaves and 9 ft. to ridge, with intake ventilators through the floor and exhaust vents in the ridge similar to the laying houses.

The windows, two tiers, run almost the complete length on the south side. There are none in the back or at either end. There is a door at each end.

It was originally fitted with eight hot-water hovers, each of 200-chick capacity. These were displaced some years before the war by a battery brooder and some single-tier brooders in what proved a successful attempt to combat coccidiosis.

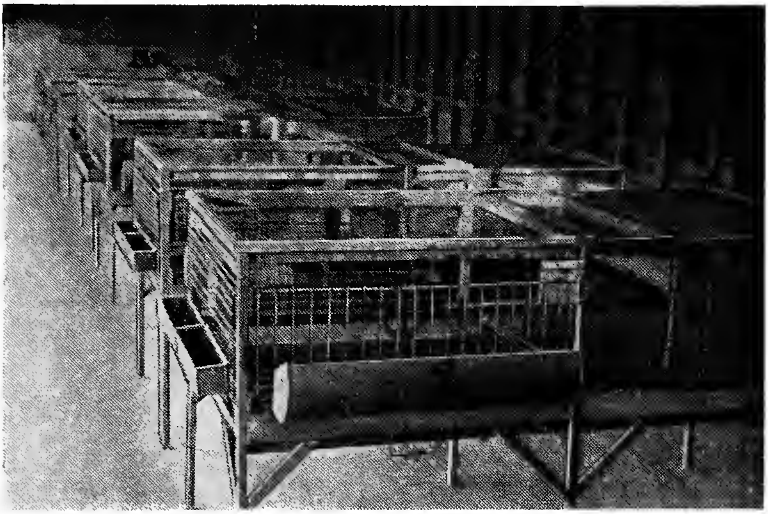
Before making the change, I went through the whole paraphernalia of singeing the whole of the inside of the house and everything in it with a blow-lamp. Then when the next batch of chicks were put under the hovers the litter was changed daily and special anti-foul food troughs used.

None but myself went into the house and I changed my shoes in a disinfectant box on entering. All these precautions proved unavailing.

Each succeeding batch developed cocci in various degrees, so something had to be done. The margin of profit in egg farming is not wide enough to stand much of a strain caused by upsets of this sort. And what is left of the profit after a bad rearing season certainly does not repay anyone for the time and trouble spent in combating disease.

The only thing is to avoid the disease, and wire floors solved the problem.

I have been told that it is quite possible to get cocci amongst chicks even when reared on wire. This may be so, but as there had been no sign of any trouble here since the change over was made, and I have reared thousands of chicks since then, I think the danger cannot be very great.



Mr. Swepstone's brooder house (second stage), showing home-made single-tier Carry-on brooders with capacity for 400 chicks. One thing photo does not demonstrate is the adequate ventilation.

The most important single item in connection with the brooder house is that it should be well ventilated.

This can only be achieved if there is sufficient air space in the house itself for the number of chicks in it. At one time eight changes of air per hour was considered the ideal.

To make any sense the number of air changes should be coupled with a stated number of cubic feet per bird.

For instance, if a hen were placed in a half-size tea-chest and given only eight air changes per hour she might easily be asphyxiated, because her body would take up nearly all the air space in the chest. But if she were put into the Albert Hall and all doors and windows hermetically sealed, she would live out her life in perfect comfort without any air changes at all.

Frankly, I do not know how many cubic feet should be allowed in a brooder house, nor how many air changes are needed per hour.

My own house will cope with 100 chicks a week up to eight weeks of age. That is to say, when full, there are 800 chicks in it at the most if there have been no losses at all—a most improbable state of affairs.

Very likely it would take a larger number, but I should hesitate to increase at the risk of spoiling what has been proved successful.

One way of preventing oneself from putting too many chicks into the house is to use brooders of the table variety, single-tier pattern.

Then, if there is enough headroom for the attendant, plenty of space round the machines for him to move in and the brooders only filled to half listed capacity, there will be little chance of cubic air space being insufficient.

My own tier brooders are " Morecotes " of all-metal construction about 7 ft. long and 2 ft. wide. One end is enclosed for about 2 ft. 6 in. and forms the hot compartment, heat being provided by a small blue flame lamp.

Food troughs are suspended outside on the sides and water is in a trough at the end, also hung outside. The chicks feed and drink through adjustable slots.

The floor is ½ in. square mesh wire, which is most satisfactory up to four weeks, the age at which they are moved to carry-on brooders.

On arrival the chicks are put in the hot compartment and prevented from straying by a movable cross partition in which there is a water trough.

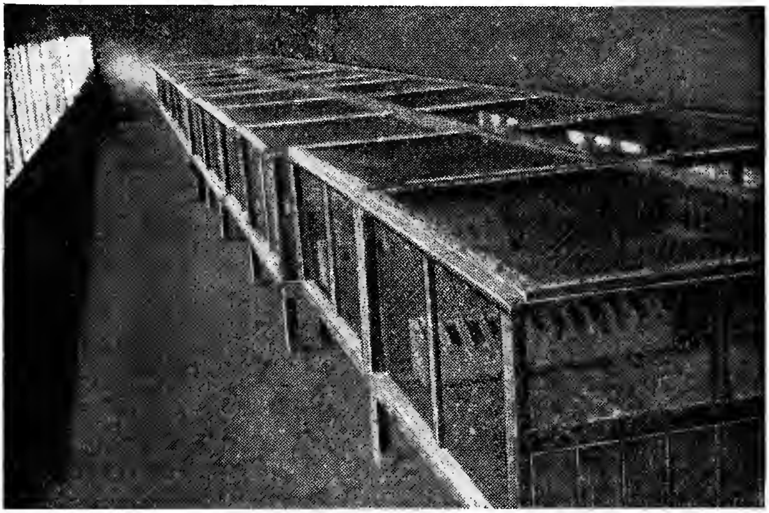
For the first two or three hours the partition is placed 4 in. to 6 in. away from the hot compartment, so that the chicks can drink, but are still near enough to the heat not to get lost. The partition is then moved back to about 1 ft. away, exposing the slots to the food troughs.

If it is getting dusk when this move is due, I usually leave it until the next day, as the chicks are seldom particularly interested in food to start with. It is water they want, and they find it with astonishing speed, unless they have been chilled in transit. If this has unfortunately been the case, their principal interest is heat.

I do not wish to mislead the novice into imagining that every chick which fails to rush out at once for a drink must of necessity be chilled. I am referring to general behaviour—*i.e.* a tendency to run out for a drink, then back for a warm and so on, as against a general disinclination to leave the hot compartment at all. And it must be remembered that this will vary according to the room temperature.

Even quite well-grown chicks will gobble their rations and hop back to the hot end when the room is cold.

At mid-day on the day after their arrival chicks are given half the available run by moving the partition still further, the next day it is moved to the three-quarter position, and the day after taken out altogether.



These cages represent the third stage in Mr. Swepstone's chick-rearing system—when the birds are hardened off. They never go out before they go into laying batteries.

Since adopting this method there has been no need to hang round the brooder poking back any chick which appeared to be chilly but unable to find its way home. Even at night they put themselves to bed without any assistance.

For their additional comfort, for the first five nights only, the floor wire in the heated end is covered with a piece of hessian. No attempt is made to clean the droppings off this until it is taken out. The heat keeps the hessian mat quite dry, and, although it becomes a bit caked with droppings, the air in the hot compartment does not smell foul.

The first feed, which is continued for eight weeks, is National Baby Chick Food, containing Vitamealo Chick Concentrate. This is proving most satisfactory in every respect.

For the first week at least, unless the weather is more than usually favourable, windows are kept closed. It is astonishing how a lightish wind, even from the back, will tend to change direction on hitting the house and pour in at an open window in front.

I do not consider the benefit of direct light at this early age to be worth the risk of the damage which may be caused by a cool wind blowing on to the chicks. Even at two to three weeks, I am still careful about this wind question.

It is better to avoid chills and rely on the vitamin D contained in the chick food rather than be over anxious about direct light.

At the same time the house must not be allowed to get stuffy. There must be adequate ventilation to keep the air sweet even if the windows are shut. Good chicks cannot be reared in a fuggy atmosphere.

HARDENING OFF.

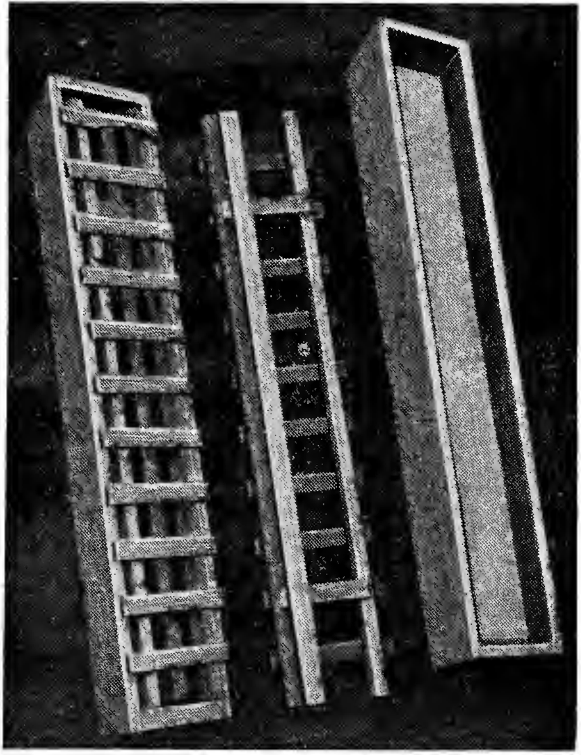
At four weeks the chicks are moved from the Morecote brooders to carry-ons. These are also of the table type, but have a floor area about 50 per cent. greater. The contents of one Morecote are divided into two carry-ons.

The carry-ons have no name, as they were made on the premises, but the general principle is the same. They are electrically heated, but the degree of heat supplied is very much less than with the Morecotes. The floor wire is increased to ¾ in. mesh and larger food and water-troughs are used.

If one could be certain of an unfailing electric supply I would use it for day-olds as well, but I do not care to risk the current being cut off for an hour or so with very young chicks. It might do them considerable damage, whereas at four weeks the risk is so much less that one can take it with a fairly quiet mind.

Once chicks reach the carry-ons they get much more severe treatment so far as windows are concerned, as these are kept open as much as possible unless the wind is really blowing directly on to birds or it is too cold. Heat is dispensed with altogether as soon as the chicks are six weeks old. They remain in the carry-ons for another two weeks, but the current is turned off.

The aim in view during the carry-on period is to bring the chicks on so that when they leave the brooder-house for the next growing stage they will not suffer any check. Growth and development should be steady and unchecked from day-old to maturity to get the best results. Any sort of upset is likely to leave traces and may easily result in a number of culls.



Type of mash-saving food hopper designed by Mr. H. E. Swepstone for use in his Intensive Rearing Units after leaving the Carry-on chick brooders.

As regards culling. During the first ten days it is an easy matter to pick out any chick which is obviously no good. After that they become more lively, and I favour leaving them alone as far as possible until the transfer to carry-ons at four weeks. They are culled then with some severity, and again at eight weeks when being taken out of the brooder-house.

Sometimes, of course, a chick has to be taken out between times. It may be damaged or pecked, but except for this sort of thing I try to disturb them as little as possible.

There is generally a little feather-picking under this very intensive method of rearing, but it is very seldom that blood is drawn during the brooder-house stage.

Feathering is a bit loose compared to range rearing, but growth, age for age, is probably better under my method and health is excellent. The average sort of out-turn of good culled chicks at eight weeks is about 85-90 per cent.

Daily routine—feed, water, cleaning droppings trays, attending to lamps and sweeping out the brooder-house—takes an hour and a quarter. This may be a longer or shorter time than with other types of brooder. I do not know because I never timed the work before adopting the present system.

When one batch of chicks is moved on, the wire floors are taken out and cleaned before the next batch is put in. The floors are soaked for an hour or more, after which it is only a matter of minutes to brush them perfectly clean. The brooders are given a dry scrape at the same time.

How long this takes it is difficult to say as the work is done in two or three bites, but I should say it takes less time than cleaning out a floor hover and putting down fresh litter.

Personally, I like to start the brooder routine work so that it is finished just before dinner, but it does not matter in the least when it is done provided a regular hour is adopted and stuck to.

In addition to routine, periodic visits should be made during the day to attend to windows or top up water. My first job of the day is to look round the chicks, which takes about five minutes.

Subsequent visits, just before tea and last thing in the evening, are made when I am passing that way, so the time taken is negligible. But one must always have the brooder-house at the back of one's mind so that a sudden change of weather or wind will ring a mental alarm bell.

One last point before passing on to the next stage of growth. On no account try to economise on the price of chicks. You will get out of the brooder only what you put in, and cheap chicks are likely to be poor quality, which will not be converted into anything better no matter how well fed and looked after. Be prepared to pay your supplier a good price, he has to live, too.

TWO SYSTEMS FOR 2ND EIGHT WEEKS.

Rearing on wire floor for the first six or eight weeks of a pullet's life is no novelty.

I know of one farm where it has been common practice since somewhere about 1927. And in the case of cockerels, a lot of table birds used to be reared in this way, not only for the first eight weeks, but right up to killing age.

When I first started wire-floored brooders it was with the idea of carrying on the pullets after eight weeks in an intensive house littered down with peat moss.

This idea did not work out as hoped for, because once again there was trouble with coccidiosis.

However, this time I did not waste any time or energy with blow-lamps and repeated litter changing. Instead, all subsequent chicks were put on wire floors for the second eight weeks and there has been no trouble since.

There were on the place some 7 × 5 ft. colony houses, lean-to type with solid floors, in which I fitted ¾ in. mesh woven wire floors raised 4 in. up. This is not sufficient clearance, because the wire has to be taken out too frequently to clear the manure.

In building small houses specially for this purpose, a clearance of 10 in. to 12 in. should be allowed between wire and solid floors so that the only clean-out needed would be when the birds were removed.

Wire-floored sun-parlours of approximately the same floor area as the houses were added, from under which the manure is removed only about once a season as they stand well off the ground. The sun-parlours are of the simplest construction.

The floor frame is of 2 × 2 in. at 2 ft. centres covered with 16-gauge wire netting 2 ft. wide and 1 in. mesh. The rest of the parlour is made of ¾ × 2in. batten covered with 19-gauge netting, 1 in. mesh, with the exception of the side opposite the house.

This is wired only half-way down, the lower half consists of a wooden shutter, hinged at the top and opening outwards to form a protective roof for the food troughs.

On hot sunny days a couple of feed bags are put on top of the parlour to give the birds some shade, and in cold windy weather bags are tacked on the weather side to afford protection from the wind.

Water is supplied in a half-round trough of about one gallon capacity placed inside the parlour standing on the wire floor. An improvement is long overdue in this matter of water.

It would be much better to fit a shelf outside the parlour, stand the trough on this and open a slot in the wire for the birds to drink through. I have been meaning to do this for some time as it would save lifting the top to get at the water trough, but it is one of those jobs which have had to wait for the odd spare minutes which so seldom come.

When the eight-weeks pullets are first put into the colony house they are shut in until the following morning, water and food troughs being placed inside with them.

In the morning, when the pop-hole is opened, the water trough is put outside, about 1 ft. away from the pop-hole, where it can be seen from inside the house. As a general rule chicks are not very slow in coming out, but some may hang back.

The sight of their sisters drinking will soon bring out the laggards once they begin to get thirsty. A couple of days later the water is put in its permanent position at one end of the sun-parlour.

For four or five days food troughs remain inside the house, after which they take their place under the wooden shutter previously described.

One should not be tempted to put food back inside the house even in bad weather, because the chicks will stay by their food and only come out for a quick drink or an occasional short walk round, and then the value of the sun-parlour is lost.

I usually shut the chicks into the house at night for the first week until they are accustomed to their new quarters. After that it is just as well to take a look round at dusk to see that they have all gone in, as sometimes they park down in the parlour for the night.

It probably wouldn't hurt them to stay there if the weather were good, but their night vision doesn't seem to be particularly adequate, so, if it came on to rain, they might prefer to stay put rather than search for the pop-hole in the dark.

In pre-war days most poultry-men fed their young stock on a " growers' formula " as a step between baby chicks and layers' mash.

During the war I abandoned refinements of this sort, as did most other people, and now change the feed from baby chick direct to layers. The change is made over a week by mixing the two feeds in varying proportions.

First, two baby chick to one of layers, then equal quantities of each, and finally one of chick to two layers.

Each mixture is fed for two days, and after that they get straight layer's mash. The question of grain feeding does not arise, because all my birds are fed on dry mash only at all ages.

The objection to the colony house system of rearing from a laying battery man's point of view is that he has to attend to his birds in all weathers in the open. It is very nice work with the sun shining, quite pleasant on sunless but dry days, but exceedingly uncomfortable in rain and snow. Particularly in the absence of rubber boots.

So, about five years ago, I decided to try as an alternative rearing again in an intensive house. But this time with wire floors.

I brought into the house a dozen surplus sun-parlours and arranged them side-by-side, leaving a service passage back and front of the house. The house faces south with windows, hinged at the top to open inwards, running the full length of the south side. The sun-parlours thus form single tier cages (for the sake of clarity I will refer to them henceforth as " cages "), each about 7 ft. × 5 ft. and 2 ft. 6 in. high, raised 1 ft. off the house floor.

As a protection against possible draught, light-weight screens of cheap quality roofing felt were placed against the cages on the north side. After an odd bird or two had got out and taken refuge under the cages, I also tacked a few battens across the opening between house and cage floors on the south side and at the two ends.

Food and water troughs are put inside the cages, just standing on the wire floor, and I will admit right away that this is far from ideal as the cage tops have to be moved when feeding and watering.

If I decide to continue using cages on these lines, both food and water troughs will have to be attached to the outside with apertures for the birds to put their heads through.

Another improvement will be a narrower batten in the wire floor construction. In the open 2 in. × 2 in. bearers are quite satisfactory because the rain keeps them clean, but under cover they soon get caked up with manure.

Raking out the manure from under the cages tends to disturb the birds, and it also adds another job to the routine round. So, as there is plenty of clearance, I tried leaving it until the birds were moved out. That is for the full eight weeks. This worked very well as there is very little smell from the manure until is it disturbed, but for a permanent job I should prefer something in the shape of a droppings tray.

So far the house floor does not appear to have suffered, it is very heavily creosoted periodically, but a wood floor can hardly be expected to stand such treatment indefinitely.

Although, owing to the impossibility of obtaining materials to properly equip the house for under-cover rearing, I have had to make do with what there was, I am quite satisfied that thoroughly sound pullets can be produced on these lines. Sound, that is to say, for the purpose for which they are required.

I do not suggest for one moment that they could be bred from, but that is beside the point as the question of breeding does not arise. For laying battery work one wants a pullet that will live and lay and make a good boiling fowl when the time comes.

As regards the relative merits of colony house with sun-parlour as against cage rearing under cover, feathering is slightly better with the former, but apart from that I can detect no difference whatever.

On the other hand, comparing the methods just described with outdoor rearing, I notice that all visitors here comment on the outstanding growth of my birds, and I know myself that they mature more quickly than range reared.

There is another valuable advantage in intensive rearing. There is not so great a variation in the age at which they start laying as between one season of the year and another.

ONE MAN—1,200 CAGES

A question which often exercises the mind of the intending battery farmer is the number of birds which one man can look after on the cage system. It does not help a lot to reply that it depends on the man. Nevertheless, this very definitely is the case, coupled with the type of layout with which he has to work.

It is quite a simple matter to check the main routine work. For instance, I find by timing myself when working at normal speed that it takes the following for 500 birds per week :—

Feeding (three feeds), total 4 hours per week.

Water (clean and refill once, top-up twice), total 4½ hours per week.

Clean droppings trays and sweep out (once) total 3 hours per week.

Egg collection (daily), total 3½ hours per week.

Total routine work for 500, 15 hours per week.

On this basis one man would spend 45 hours weekly attending to routine work for 1,500 birds. And, as the above times were taken during the period of full production, they represent the maximum.

When eggs are less plentiful there will be a slight saving in time all round. Less food need be carried in, the contents of the water cart will go further, and therefore the cart needs less refilling, there are fewer eggs to collect and a less number of barrow loads of manure to wheel away.

Feeding stuffs are still pretty poor in quality, and when we get back to pre-war standards and can feed twice weekly instead of three times, as at present, there will be a further saving of time. This saving applies also in the case of water, because the bulky dry mash of today requires much more to wash it down.

Although the actual number of hours required, *i.e.* 45 to look after 1,500, approximates almost exactly to a five-and-a-half-day week of eight hours per day, it would be a mistake to instal that number of cages and expect to look after them single-handed. Unless, of course, the owner was prepared to work considerably longer hours.

It is all very well to time routine work, in fact, it is a very excellent thing to do, as it serves as a spur to keep one up to the mark. But for practical working conditions one must make allowances for the unexpected hindrance which will crop up, such as a case of prolapsus and an escaped bird.

These are quite minor matters which may take only a few minutes, but they will make havoc of the day if every minute is occupied in advance with routine.

Then there are such jobs as house creosoting, spring-cleaning of cages, the odd roof repair or roof painting, periodic delousing, delivery in of food, despatch of eggs, arrival of new 16-weeks-old pullets and despatch of boiling fowl.

One might also include calls by travellers in feeding stuffs and appliances. This makes quite a formidable list of " extras " all of which take up a certain amount of time.

How much time depends so largely on the individual and in the case of say, spring-cleaning, creosoting, and so on, on his methods and equipment, that it is impossible to make any kind of estimate.

For instance, to spring-clean a single-sided block of 12 cages can take half a day if it is done fairly thoroughly with wire brush, hand scraper and creosote applied with a brush.

On the other hand, if only the floors are taken out, the worst of the dirt knocked off quickly and the whole dipped in a creosote tank, the job could be done in about three-quarters of an hour.

A tank big enough for the job would have to be a large one, and might not be worth it on a small place.

My opinion, for what it is worth, is that one man can attend to routine and " extras " for 1,000 to 1,200 cages without assistance, but he will be kept very busy doing it in a 45-hour week.

I must point out, however, that he will not be looking after 1,000 to 1,200 laying birds. Pullets do not lay their first egg immediately they are caged. In fact, they usually spend 6 to 10 weeks in the cages before starting production. Say the average time is 1½ months or one-eighth of a year; then, over the whole year, 1,200 cages will only average 1,050 layers, *i.e.*, the number of cages minus one-eighth. Then we must deduct another 50 layers for mortality at the rate of 10 per cent. spread out over the full twelve months, which leaves a net 1,000 as the average number of layers which one may reasonably expect to house in 1,200 cages.

On the above basis, taking wages at £4 0s. 0d. a week, the cost of labour works out at almost 4s. 2d. per layer per year.

If pullets are caged at a later age, say 18 or 20 weeks, instead of 16, the average number of layers for the year will be greater because they will spend a shorter time in the cages before starting to lay.

Against this must be set the fact that the older pullets will cost more in the first place. It is really a question of how much more they will cost. I cannot say what the position is likely to be in the future, but I found before the war that 16 weeks was the most economical age at which to buy.

Of course if the battery man is doing his own rearing it might pay him to keep pullets out of the cages until they are nearly on the point of lay. This is not a question on which it is possible to generalise as there are so many ways of housing growing stock.

If it is cheaper under existing individual circumstances to house and look after the growing pullets away from the cages from 16 weeks onwards, then it would appear the better way. For me, under the conditions on my own place, 16 weeks is the most economical age to cage the birds; hence I stick to it.

LAYING BATTERY COSTS AND PROFITS

The question of how much profit there should be in egg farming on the battery system is one which I tackle with the greatest reluctance. There are so many factors to be taken into account, none of which can be forecast with any degree of accuracy, that to make any kind of estimate of probable return is very little better than guesswork.

First of all, what size layout is under consideration and how is it to be stocked ? A unit of 1,200 cages is a convenient size for the purpose, and, as regards stocking, if I were starting up now I should most certainly buy day-old pullets and rear them on the premises.

There is not enough margin in egg farming to cover the cost of buying 16 weeks pullets at, say, 18s. each, and then spending another 3s. on the feed they will eat before they start to lay. Certainly not if one can produce a pullet in lay for 12s. 6d. if reared at home from day old.

I should add that 12s. 6d. is the cost of all pullets reared on my own place during 1944. In 1945 I expect the price to be very much the same because, although day-olds are a little higher in price, feeding-stuffs are better quality and consumption is a trifle lower.

As regards the 3s. to feed on from 16 weeks, this is based on actual tests carried out over this particular period of the bird's life.

As mentioned on several occasions previously, 1,200 cages will not accommodate 1,200 layers for the full year. The actual average number for the year which I should aim at would be 1,000. The balance of 200 cages will be fairly fully employed in housing pullets prior to their starting to lay—*i.e.*, between the age of 16 and 18 weeks and their age when they lay their first egg.

I assume all birds come into lay at six calendar months, or 26 weeks. Some will be earlier in practice and some later, but the average should be about right.

As the purchase of matured pullets is ruled out, the only way by which it would be possible to stock all the cages at one go would be by installing brooder and rearing capacity big enough to take at least 1,500 day-old pullets. At 80 per cent. rearing this would provide the 1,200 pullets and for the rest of the year the rearing plant would be idle. This scheme would be just about as uneconomic as the buying of matured pullets.

In my view by far the best way of stocking with home-reared birds is to instal a comparatively small rearing plant and fill the cages gradually. For the 1,200 cages in question I should want to rear to maturity 100 good pullets each month. On the basis of 80 per cent. rearing this would call for the monthly intake of 125 day-old pullets.

KEEP YOUR CAGES FILLED.

Before attempting the question of profit, I must endeavour to show at what rate the cages will fill up and how long after the start is made that the desired target of 1,000 head of layers will be achieved.

Every month from the very beginning there will be a certain amount of wastage amongst birds in cages.

The rate varies from month to month, but taking the year as a whole, mortality and culling account for about 5 per cent. each month of the current stock.

In September and October, when moulting is at its height, the percentage is higher, the increase depending on whether birds are kept for a second year or not. Under existing conditions it pays better to retain many moulters for a second season, but, even so, during the two months mentioned the rate of wastage will rise to about 12½ per cent. per month in a normal full year.

In the Table following, the first 100 birds come into lay in September. In October the second 100, and so on as shown in column 1. In October 5 per cent. of the previous month's intakes are deducted to cover wastage—*i.e.* five birds (see column 2). Column 3 is the difference between column 1 and column 2—that is to say, the number of birds which are to be added to the total stock for the month, as shown in column 4.

To make this point clearer I will take the last month of Table 1. In August 100 birds come in as usual (column 1). The preceding month's total stock was 862 (column 4). Five per cent. of 862 is 43 (column 2), deduct 43 from the 100 intake leaves 57 (column 3), which, added to the previous month's total stock of 862, gives the total stock for August as 919 (column 4).

On the basis of 100 new pullets monthly coming into lay the total laying stock at the end of the first 12 months could be expected to be just over 900.

TABLE 1.

Month hatched.	Month starting production.	Number of new pullets in lay.	Wastage *i.e.*, Mortality & culling.	Nett increase per month.	Total layers for month.
March . .	Sept. . .	100	—	100	100
April . .	Oct. . .	100	5	95	195
May . .	Nov. . .	100	10	90	285
June . .	Dec. . .	100	14	86	371
July . .	Jan. . .	100	19	81	452
Aug. . .	Feb. . .	100	23	77	529
Sept. . .	March . .	100	26	74	603
Oct. . .	April . .	100	30	70	673
Nov. . .	May . .	100	34	66	739
Dec. . .	June . .	100	37	63	802
Jan. . .	July . .	100	40	60	862
Feb. . .	Aug. . .	100	43	57	919
		1,200	281		12)6,530
Average number of layers for full year . .					544

TABLE 2.

Month hatched.	Month starting production.	Number of new pullets in lay.	Wastage	Nett increase or decrease per month.	Total layers for
March . .	Sept. . .	100	92	8	*927
April . .	Oct. . .	100	93	7	934
May . .	Nov. . .	100	47	53	987
June . .	Dec. . .	100	49	51	1,038
July . .	Jan. . .	100	52	48	1,086
Aug. . .	Feb. . .	50	54	—4	1,082
Sept. . .	March . .	50	54	—4	1,078
Oct. . .	April . .	50	54	—4	1,074
Nov. . .	May . .	50	54	—4	1,070
Dec. . .	June . .	50	53	—3	1,067
Jan. . .	July . .	—	63	—63	1,014
Feb. . .	Aug. . .	50	51	—1	1,013
		800	706		12)12,370
Average number of layers for full year . .					1,030

* The figure 927 is arrived at by adding nett increase for the month of 8 to final figure of 919 in Table 1.

The totals at the foot of the columns 1 and 2 represent respectively the number of pullets into lay during the year and the total wastage. Column 4 added up and divided by 12 gives the average number of layers for the full year.

Turning now to Table 2. The normal moulting period comes in the first two months and, to allow for this, the rate of wastage is increased to 10 per cent. As this is only the beginning of the second year, there will be no pullets which have laid for more than 12 months, so there should not be many extra ones to be culled when moulting. In fact, 10 per cent. may be a bit on the high side. In the third year and thereafter the rate at this time of the year will be about 12½ per cent., as mentioned above.

As will be seen on reference to Table 2, the target of 1,000 layers is exceeded in December, the fourth month, and that the peak is reached in the following month at 1,086 layers.

After that the intake of new pullets need be only enough to cover culling and mortality month by month. So long as this is in the neighbourhood of 50—*i.e.*, 5 per cent, of 1,000—the brooder plant need only be run at half capacity to keep things going. It will be during the moulting period with its higher rate of discard that an increased number of new pullets must be arranged for. Therefore the brooder house must be filled up at the right time to provide the full quota of pullets when they will be wanted.

Table 2. Column 4 added up and divided by 12 gives the total number of layers kept for the second year at 1,030. In Table 2, as in Table 1, the totals of columns 1 and 2 give the numbers of new pullets in and discards for the year. The only difference between the two tables lies in column 3. In Table 1, the figures in this column are all added to the preceding month's total in column 4, whereas in Table 2 they are sometimes deducted when wastage exceeds the intake of new pullets.

The reason for attempting to work out the process of gradually filling up on these lines is to find the totals of columns 1, 2 and 4, because it is these figures which are wanted before it is possible to estimate the probable profit.

I do not suggest for one moment that these tables are accurate in detail, except for the arithmetic.

1,200 BIRD PLANT COSTS £3,000.

In explaining the Table of probable stock position I made it very clear that the figures can be regarded only as "approximate." I need not apologise, therefore, if, in the estimates which follow, the nearest round numbers are taken.

In order to make a reasonable calculation of probable profit (or loss) the amount of capital invested in the venture should be known. Unfortunately, so long as houses and cages are unobtainable, except at second-hand, it is quite impossible to make any definite statement that any given number of cages, complete with housing, will cost a given amount of money.

The best one can do is to estimate the probable cost in terms of pre-war prices plus some arbitrary percentage, which I propose to take as 100.

In 1939 houses and cages together cost about 15s. per bird. Doubling this cost, today's price would be 30s, or, for a 1,200-cage plant, £1,800. Other plant required would be rearing equipment to handle an intake of 125 day-old pullets monthly all the year round.

To reduce the number of brooders and carry-ons wanted I should arrange for half the monthly requirements to be delivered fortnightly.

Frankly, it is not much more than guesswork to estimate the cost, but I am putting the brooder house at £150, two brooders (day-old to four weeks) £20, four carry-ons (four weeks to eight weeks) £40, and 15 colony houses with verandas (8 to 16 weeks) £225, making a total of £435 for rearing plant and equipment.

As a matter of fact, 12 colony houses would be sufficient up to 16 weeks, but it is very handy to have enough to run pullets on an extra couple of weeks in case of need.

Cost of rearing 1,200 pullets at 12s. 6d. each will require another £750, so that the capital outlay may be expected to be something like this:—

	£	£
Dead Stock		
Laying cages and housing ...	1,800	
Rearing plant, etc.	435	
		2,235
Live Stock		
1,200 pullets at 12s. 6d.... ...		750
		£2,985

No allowance has been made for working capital as the above outlay will be extended over a period, and returns will begin to come in before the total capital expenditure is completed. In the estimates which follow, depreciation on dead stock is allowed for at the rate of 10 per cent.

Taking the first year's estimate of revenue and expenditure. The cost of 1,200 pullets brought into lay is shown at £750. Food is allowed for 540 layers, viz., the average number of layers kept for the full year as shown in the Stock Table.

The quantity consumed per layer is put in at 1¼ cwt., which is about ¼ cwt. more than the average bird would eat if feeding stuffs were of pre-war quality.

However, 1¼ cwt. is in accordance with the quantities of feeding stuffs consumed on my own plant during recent years and I cannot see any hope of a reduction in the near future.

Rationed foods may improve in quality, but we shall still have to make up quantity by using such unrationed articles as can be got, and these cannot be expected to have the same food value as goods on coupon.

The only other items of direct expenditure are £50 for general expenses to cover lighting, insurance, water and office expenses and so forth, and labour at £208 being one man's wages at £4 0s. 0d. per week. No allowance has been made for rent.

On referring to the receipts side of the first year's estimate, reference must again be made to Stock Table 1, where it will be found that 280 birds were discarded during the year, and at the end of the year a stock of 920 layers remained in the cages.

I have found that mortality, birds which die or are unfit for sale, usually comes to about 10 per cent. per annum of the average number of layers kept for the full year. Therefore, of the 280 discarded, 50 (*i.e.* about 10 per cent. of 540) will have no value, leaving 230 as sold. The price is put at 7s. each, based on the controlled wholesale price of 1s. 4d. per lb. live weight.

The stock of 920 birds at the end of the first year is valued at the same price.

Egg output per layer is estimated at 15 dozen, which, from 540 birds, gives a total yield of 8,100 dozen sold at the controlled price of 3s. 3d.

On the first year's working there is a small nett loss, which is only to be expected while the plant is operating over the full year at an average of about half capacity.

As a matter of fact the loss will all be incurred in the early months, while the number of layers is small.

As the cages fill up, income will gradually overtake expenditure, and for the latter part of the first year the plant should be more than self-supporting.

Turning now to the second year's estimates, the first item of expense is £322, being the value of 920 birds brought in from the previous year. Then referring to Stock Table 2, we find only 800 pullets will be wanted to maintain the stock at the target figure of 1,000 average layers for the year. These, at 12s. 6d. each will cost £500. Feed for the layers, average 1,000 head, based on a similar consumption as in the first year, will amount to £1,094.

General expenses are the same as before at £50, but in the subsequent years this item will increase as repairs begin to come into the picture. Labour is raised by 50 per cent. because, although one man can do everything in connection with 1,200 cages, he will require assistance when both laying and rearing plants are in full swing at the same time.

Depreciation on plant and equipment is at the same rate, but, as 10 per cent. was written off in the first, the amount of this item is correspondingly less in the second year.

On the revenue side the estimated sales of boiling fowl are shown as 600, as against a total of 700 discarded in Stock Table 2. The difference of 100 represents mortality of the 10 per cent. on 1,000.

No reduction in egg output is allowed for because, although the stock in the cages now includes a number of second-year birds, only those will be retained which continue to deliver the goods.

The stock in the cages at the end of the year, 1,000 layers, is again valued at the controlled price of 7s.

This leaves a nett profit of £518 which is about 17 per cent. on the capital invested. Considering the work and risk involved, this is not a very high return, and it does not leave much of a margin for contingencies.

AVOID UPSETS.

If several batches of chicks turn out poorly and/or there are outbreaks of colds amongst the layers, the profit may easily shrink to vanishing point. Another drain on profit may easily occur in stock replacement.

If a larger number of layers than anticipated has to be culled and sold for 7s. each, an increased number of pullets will be needed to replace them. And these pullets will cost 12s. 6d. each. Furthermore, as it will take several months to produce these extra pullets, there will be a period when the laying stock will fall below the requisite number. During this period egg income will naturally suffer. In fact, any such upset has a cumulative effect which may take months to recoup.

Striking a more optimistic note and assuming that the plant is reasonably well managed and has reasonably good luck, I have not over-estimated anything on the revenue side, nor, so far as I can see, under-estimated the running expenses.

A slightly lower food consumption or a few extra eggs per bird would brighten the position quite a bit.

Furthermore, if suitable buildings are available on the chosen site, or reconditioned cages and rearing equipment can be bought at less than the figures mentioned, a considerable capital saving might be possible.

What I have tried to show in these figures and tables is the probable position starting from scratch.

Anyone able to take-off part way up the course will naturally have an advantage.

Tables and estimates both start as from the point in the plant's development where production begins. Prior to this, of course, the rearing equipment will have been in operation for about six months.

I have not attempted to combine details of the cost of rearing in the estimates. It would only confuse the issue without serving any useful purpose. The only thing which concerns profit and loss is the actual cost of a pullet when she starts to lay, and this I put at 12s. 6d. which is what my pullets cost me.

FIRST YEAR

EXPENDITURE

	£
1,200 pullets at 12s. 6d.	750
Feed for 540 layers at 1¼ cwt. = c/f 675 at 17s. 6d ...	590
General Expenses	50
Labour	208
Depreciation on Dead Stock £2,235 at 10% ...	223
	£1,821

Revenue

	£
Sale of Culls, 230 at 7s.	80
Sale of Eggs, 540 birds laying 15 doz. = 8,100 doz. at 3s. 3d.	1,316
Stock of Layers at end of year, 920 at 7s.	322
Nett Loss	103
	£1,821

SECOND YEAR

Expenditure

		£
Stock of layers at beginning of year, 920 at 7s.		322
800 Pullets at 12s. 6d.		500
Feed for 1,000 layers at 1¼ cwt. = 1,250 cwt. at 17s. 6d.		1,094
General Expenses		50
Labour		312
Dead Stock Depreciation:	£	
Original Cost	2,235	
Less Written Off	223	
	2,012	
10 per cent. on		201
Nett Profit		518
		£2,997

Revenue

	£
Sale of culls, 600 at 7s.	210
Sale of Eggs, 1,000 birds laying 15 dozen = 15,000 doz. at 3s. 3d.	2,437
Stock at end of year, 1,000 at 7s.	350
	£2,997

FEEDING

With the exception of some experiments made several years ago in pellet and corn feeding, I have always stuck to dry mash for my laying batteries.

When rations were at their shortest I was tempted to adopt wet mash so as to make use of potatoes, fish waste, etc. but the additional time required made it quite out of the question.

There is not only the cooking and daily distribution but also the daily job of trough cleaning to be taken into account when assessing the labour involved in wet mash feeding.

However thorough the bird may be in clearing up her trough, it will still need cleaning out to prevent it becoming sour.

So I had to look about for off ration feeds which could be fed dry and which combined a reasonable food value with a not too exorbitant price.

Dried Food Meal and Grass Meal have provided the sole source of such extra supplies with the occasional use of Oatfeed Meal in small quantities. I must admit I am not impressed with Oatfeed even when feeding stuffs are very short, but it does help to expand the rations in times of great stress although I doubt if it contains very much in the way of nourishment.

Dried Food Meal on the other hand has proved itself a great standby and for mixture purposes can be regarded practically as a complete food. By this I mean to say that a balanced mash will not become unbalanced by the inclusion of Dried Food Meal although, in order to offset its lack of bulk, I add some extra grass meal or bran.

A pre-war formula which I used with great success and one I should be glad to be able to use again is as follows :—

Bran	10 lbs.
Middlings	40 ,,
Barley Meal or S.G.O.	10 ,,
Yellow Maize Meal	33 ,,
Grass Meal	10 ,,
Meat and Bone Meal	9 ,, (60% albs)

Add to above 10 ozs. common salt, 1% C.L.O.

Since the commencement of rationing the mixture has had to be altered quite frequently according to conditions ruling at the moment. Only too often the alteration made to suit deliveries received did not conform with what I thought would be best for the birds.

The time of greatest alarm and despondency was when maize meal could no longer be obtained. Like most people I feared a heavy drop in output in the absence of this ingredient. As it turned out I need not have worried because the birds continued to lay very satisfactorily with the addition of Maize Gluten Meal and some extra Ground Oats to take the place of the Maize Meal.

Feeding stuffs are still difficult and are likely to remain so for some time to come. Nevertheless the formula now being fed has remained constant for quite a long time and I hope any further alteration may be in the nature of an improvement. In this connection an improvement in the quality of the ingredients would be most welcome. I feel confident that the large increase in consumption per bird is mainly due to inferior quality feeds.

Today's mixture is as follows :—

Middlings	4 cwt.	
Dried Food Meal	4 „	
Ground Oats	2 „	
Maize Gluten Meal ...	1 „	
Ground Wheat	2 „	(unmillable)
Grass Meal...	1 „	
Bran	1½ „	
Vitamealo No. 1 Cont : ...	1 „	
	16½ „	

Add to above 1% C.L.O.

The quantity of Dried Food Meal is approximately 25% of the whole mixture and I do not care to exceed this because the droppings tend to become very loose. On occasion I have included as much as 40% waste for a limited period. The droppings trays were practically awash and, though neither health nor production suffered during the three or four weeks, a continuation of such feeding would probably have adverse effects.

The proportion of grass meal can be safely increased to 10% provided the price is not disproportionately high.

Pellet feeding is very popular with some battery owners. It is an exceedingly clean method both from the point of view of the water vessels and absence of dust generally. When making comparative tests some years ago I did not find pellets more economical than dry mash feeding either as regards consumption or production.

I should not care to feed pellets while feeding stuffs continue to be rationed because it would be impossible to mix with Dried Food meal and Grass meal (both unrationed) in such a manner that the bird would be compelled to eat her share of the unrationed feeds.

It might be possible with pellets to feed Tottenham Pudding in the nature of a side-dish. Birds will eat the pudding readily unmixed, but troughs would require cleaning as in the case of wet mash feeding.